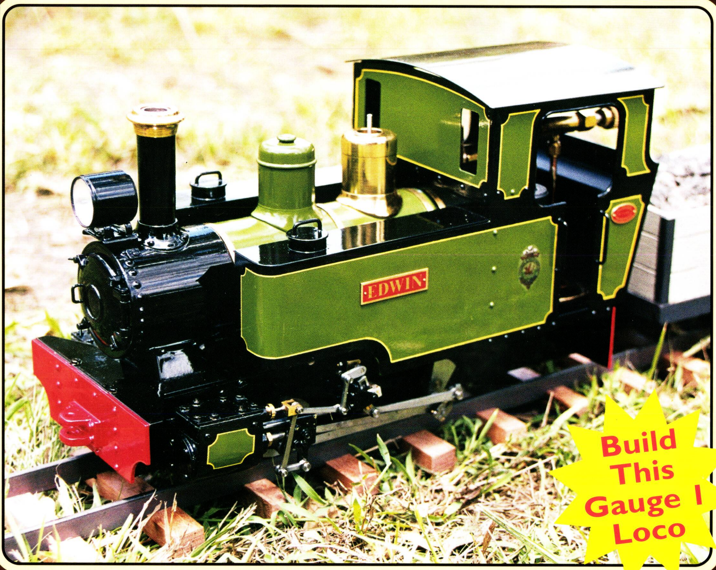
Australian Model Engineering

May-June

Issue 108

$6.50*
(inc. GST)

NZ$9.50*
(inc. GST)



Build This Gauge I Loco

LOCOMOTIVES, TRACTION & STATIONARY ENGINES, BOATS, WORKSHOP, PRODUCTS, CLUB NEWS & EVENTS, REVIEWS

In This Issue:
- ☑ *EDWIN* — A New Locomotive Construction Series
- ☑ A Nifty Cam Grinder
- ☑ Build a Load & Lift Trolley for Your Traction Engine

Print Post Approved Publication No PP228582/00001

*Recommended Retail Price

HAFCO Workshop Equipment

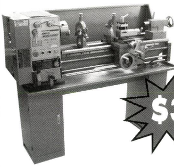
AME140303

AL400 GEARED HEAD LATHE

- 6.5" Centre height, 40" centres
- 9 speed 240volt
- Weight 390kg
- Accuracy guarantee
- Exceptional value

$3250

PRICE INCLUDES
2 Chucks, Faceplate, steadies
drill chuck, splash guard and stand



HM50 SHOWN

HM50/52 MILL DRILL

- H/Duty 2HP 240V
- 30INT spindle
- 30INT Horizontal spindle (HM52)
- Table 800mm x 240mm

INCLUDES:

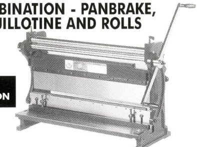
- X axis powerfeed
- Halogen Lamp
- 6" Machine vice
- Coolant system
- Metric collet chuck & set (4-16mm)

HM50-240V $4195
HM52-240/415V $5195

BS4A METAL BANDSAW

- 115mm capacity
- Heavy duty 240V
- 4-speed auto cut out
- Cast iron construction
- Vertical cutting plate
- Portable on wheels

$299 (B002)



COMBINATION - PANBRAKE, GUILLOTINE AND ROLLS

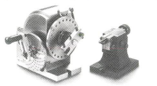
CAST IRON CONSTRUCTION

- 300mm x 1mm Capacity $425 (S648)
- 760mm x 1mm Capacity $850 (S650)
- 1000mm x 1mm Capacity $1395 (S652)

DIVIDING HEADS

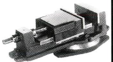
- Hardened & Ground spindle & worm
- Ratio 40:1
- Can divide direct or indirect
- Head tilts to 90°

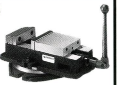
100mm (4") $529 (D001)
125mm (5") $729 (D002)



MACHINE VICES

- V104 4" Swivel $195
- V105 5" Swivel $259
- V106 6" Swivel $295
- V108 8" Swivel $475





ANGLOCK VICES

- V305 5" Swivel $395
- V306 6" Swivel $475
- V307 8" Swivel $795

Other quality vices are available from mechanical to hydraulic & pneumatic ask your nearest dealer for more information

ROTARY TABLES

- Horizontal or Vertical type
- Calibrated rim & micro vernier
- Scale dial
- Disengaging handwheel
- Adjustable back lash

OUTSIDE DIAMETER	PRICE
150mm(6")	$389
200mm(8")	$575
250mm(10")	$695
300mm(12")	$875

AUTO PARTS WASHER

- Large 90litre solvent capacity
- 240volt pump gives output of 220litres per hour
- Tank 760 x 540 x 310mm
- Weight 35kg

$169 (A368)

Bench Model 12ltrs only $89 (A370)

MEASURING EQUIPMENT

M045	Imperial dial guage 0-1"	$45
M046	Metric dial guage 0-10mm	$45
M050	Magnetic base Std	$49
M051	Magnetic base One lock	$79
M720	6"/150mm Std Vernier	$35
M725	8"/200mm Std Vernier	$45
M726	12"/300mm Std Vernier	$79
M740	6"/150mm Digital Vernier	$89
M742	8"/200mm Digital Vernier	$115
M743	12"/300mm Digital Vernier	$174
M760	0-1" Micrometer	$30
M770	0-25mm Micrometer	$30
M016	0-100mm Micrometer set	$119
M046	0-4" Micrometer set	$119

FREE
PRICED 2003 COLOUR CATALOGUE OUT NOW
RING, WRITE OR FAX

BENCH DRILL

- 240 volt
- 3/4HP
- 16-speed with 16mm chuck
- 1mtr high

$259 (D138)

Pedestal Model $299 (D140)

25" BLADE

INDUSTRIAL FAN

- 3-speed control
- Heavy duty 240v
- Oscillates to 90°
- Adjustable height to 2mtrs High
- Strong chrome guard
- Cast iron base

$259 (F012)

Wall mount model $259 (F010)

NOTE: WA prices may be higher due to freight costs

HARE&FORBES MACHINERYHOUSE
established 1930

HMC
Herless Machinery Corporation
established 1910

SUPPLIERS OF NEW & USED MACHINERY AND WORKSHOP EQUIPMENT

NSW: 1/2 Windsor Rd, NORTHMEAD 2152
Ph: (02) 9890 9111 Fax: (02) 9890 4888

QLD: 550 Kessels Road, MACGREGOR 4109
Ph: (07) 3849 1888 Fax: (07) 3849 1414

VIC: 2099 Princes Highway, CLAYTON 3168
Ph: (03) 9562 8866 Fax: (03) 9562 8329

WA: FIORA MACHINERY SALES
363-365 Sevenoaks Street, CANNINGTON 6107
Ph: (08) 9356 1811 Fax: (08) 9451 1323

Australian Model Engineering

ISSN-0819-4734

Publisher: Australian Model Engineering Pty Ltd.

ACN 008 627 825

Australian Model Engineering is published 6 times per year at 2-monthly intervals commencing with January.

Subscriptions

An annual subscription to *AME* costs just $38 (incl. GST) within Australia. NZ is AUD$47; all other countries, AUD$58 air. You can pay by cheque, money order, or overseas bank draft. You can also use your Bankcard, MasterCard or VISA credit card. **All Mail to:**

P.O. Box 21, HIGGINS, ACT. 2615
AUSTRALIA
Phone/Fax : (+61) 2 6254 1641

Copyright

All rights reserved.

Articles and drawings may be reproduced by the individual purchaser for his or her own personal use only. Otherwise, no part of this publication may be reproduced, copied, lent or re-sold without the prior permission of the publisher.

In keeping with the *Copyright Act* 1968, *AME*'s standard policy is that copyright in articles, photographs and other graphical material is shared by Australian Model Engineering Pty Ltd and, respectively, the author; the photographer; and (jointly) the persons who sketch the original graphics and draught them for publication. This may be varied in an individual case by written agreement only. A fuller description is available from *AME*. It is the author's duty to obtain permission for reproduction of somebody else's copyright material. Intending authors should consult *AME* in case of doubt.

Indemnity

Australian Model Engineering Pty Ltd or any of its principals are not responsible for the goodwill, quality of product, accuracy of information, service or the actions of advertisers appearing in this magazine. Any statements made or information given does not express or imply warranty or endorsement of a product.

Printing

Proudly printed in Australia for the publisher by:
Pirion Pty Limited, 140 Gladstone Street, Fyshwick
ACT 2609 Australia.

Post Print Post Approved.
Publication No. **PP228582/00001**

Distribution

Is by subscription, through hobby suppliers and by Gordon and Gotch Limited to newsagents in Australia.

New Zealand agent:

MBM Model Engineering
PO Box 75-153, Manurewa
Ph.: 09-235-2018, fax: 09-235-7537
www.MBMModelEngineering.com

North American agent:

Wise Owl Worldwide Publications
5150 Candlewood Street, Suite 1
Lakewood, CA. 90712-1900
Telephone: 562-461-7574
Fax: 562-461-7212
www.wiseowlmagazines.com

ADVERTISING DEADLINE

Please have your space for

July-August 2003

issue booked by:

19 May 2003

May-June 2003 Issue 108

Contents

5 Comment

9 *EDWIN* — Introduction

15 Steam Chest

19 Whatever happened to these locos?

20 A Cam Grinding Machine

23 15th Australian Miniature Traction Engine Rally

24 Lake Macquarie Celebrates 50 Years

26 Universal Test & Demo Stand for Locomotives — part 4

29 Steam Power — part 1

32 A Load and Lift Trolley

37 Back Issues

38 Club Roundup

43 Coming Events

44 Bracken Ridge & Maryborough

45 Garratt Gossip

46 The Moon Buggy

48 Update on *Red Fred*

51 Letter Box

52 Sparks 'n' Arcs

54 The LB10 Elbow Gate — Conclusion

58 Building the 16/16H Engine

59 Mark Whittaker

60 Tracks 'n' Trees

61 News Desk

New Subscription Form

62 Classifieds

Front cover

This delightful little gas-fired Gauge 1 locomotive, EDWIN, was built by Brian Wilson from Queensland. All items were fabricated — no castings required. It is the subject of a new construction series commencing on page 9. Photo: David Proctor

Celebrate with us

Echuca's 40th Steam Rally

Sat and Sun, 7th and 8th June 2003

Queen's Birthday long weekend

Over 700 exhibits expected

Including:
Traction Engines - Portables - Vintage Tractors - Classic Cars - Commercials - Stationary Engines - Motor Cycles - Working Demonstrations - Working Horses - **Miniature Steam Railway** - Trade and Craft Stands - **Model Steam Engines** - Country Market - Delicious Camp Cooking - World Champion Tree Faller, Mathew Gurr - Family Fun: Old McDonald's Farm, Bands, Court Jester, Balloonamatic Bruce and Singing Dog Championships.

New Sections:
"Australian Made" & "Junior Engineers"

All past and new exhibitors welcome, working demonstrations encouraged.

Contact Secretary: Donna Wilson for Entry Forms on (03) 5482 4126

Steam, Horse & Vintage Rally Inc., PO Box 199, Echuca, Victoria, 3564. Fax (03) 5482 4126
A Project of the Rotary Club of Echuca-Moama Inc.

"Full Steam Ahead"

A 22 Day Tour the UK departing 13 Aug 2003
from Adelaide, Melbourne, Sydney & Brisbane

This Exciting Tour Features

Three Days at the Great Dorset Steam Fair
Steam Railway Journeys
Kew Bridge Museum & Brunel Engine House
National Railway Museum
Cruise aboard the s.s. Sir Walter Scott
Lake Windermere Steamboat Museum
Basingstoke Canal Boat Cruise
A 3 day London Pass to Historic Sites
Tickets to the Edinburgh Military Tattoo
Stately Homes, Castles & Cathedrals
Whit by & the Captain Cook Museum
Shepway Lydd Air Festival

3 & 4 Star Motels, Meals & Luxury Coach

All for around AUD$450 per person per day

For a detailed brochure
P.O. Box 208 BERRI S.A. 5343
austeam@riverland.net.au
ph 08 858 22603

Put it on your calendar now!

2003
31 Oct
1 - 2 NOV
Wagga Wagga Invitation Days!

Great fun! 5" and 7¼" track in scenic surrounds. Traction engines! Stationary models! Full-size historic engines! HO scale layout! Loads of tourist attractions!

enquiries: David Font on (02) 6921 4762
e-mail: dfont@tpg.com.au

Australian
Model
Engineering

http:www.ameng.com.au

Crew

Managing Editor
David Proctor
Phone & Fax: .... (02) 6254 1641
***(Phone**: leave message before 3pm)*
e-mail: .... amemag@bigpond.com
Articles and contributions:
PO Box 21, Higgins ACT 2615

Contributing Editors
Brian Carter, John Cummings, Dave Harper, Clive Huggan, Gerardus Mol, David Wescombe-Down

Draughters
Dave Adams, Craig Belcher, Jim Gray, Peter Hall, Clive Harnwell, Rod Heslehurst, Peter Kerville, Kent Learned, Peter Manning, Peter O'Loughlin, Tim Smith, Rex Swensen

Typing and Distribution
Phyl Oliver

Contributors
Peter Dawes, Peter Hall, Ron Hewitt, Neil Mackenzie, David Mottram, Mike Munns, Bob Neal, Ken Preiss, George Punter, Mike Tyson, Brian Wilson

Advertising
Brian Carter
Phone: .... (02) 4884 1205
Fax: .... (02) 4884 1215
e-mail: ....brian@ameng.com.au

Subscriptions
Mandy Proctor .... (02) 6254 1641

Back Issues and AME Retail
Phyl and John Oliver
PO Box 1403
Tuggeranong ACT 2900
Ph/Fax: .... (02) 6292 1938
e-mail: ... jpoliver@webone.com.au

AME Local Representatives
Western Australia
Doug Baker .... (08) 9341 1630
South Australia
John Wakefield .... (08) 8362 3269
Victoria
Bill Taylor .... (03) 9458 3404
Tasmania
Jim Gray .... (03) 6394 7124
Queensland
Dave Harper .... (07) 3261 1140
NSW and ACT
Contact the Managing Editor
New Zealand
Murray Lane .... (09) 534 8396

Deadlines for issue 109

Club Roundup	**May 10**
Letter Box	**May 13**
Classified Ads	**May 29**
Mailout Date	**June 23**

Comment

Most competent — young or old?

As a model engineer for almost 50 years I can remember driving locos, mostly *Juliets* and *Tichs* because that was all there was in the 1950s, when still in primary school (about 10-12 years old) and because I was participating at the track days, I enjoyed the hobby and started to construct models.

Reaching the ripe old age of 16 and finding things like motorcycles and girls, the hobby went into the background. Although I was always interested, the construction of models basically stopped until approx. 35 years old, when I found that you are too old to race motorcycles and the wife and kids were better in the house and me in the shed — so back to model engineering.

So what is this all about you say.

If I was not introduced to model engineering at a young age I doubt if the interest would have been rekindled later. So, if we don't get the really young ones involved and participating early our hobby has a short life as most members are now showing their age, as we all know.

I can hear the cry now of insurance, etc. but when I drove the *Tichs* and *Juliets* the presidents, secretaries, etc. of the clubs then are in many cases the same people who hold these positions today. Of course years ago they were only in their 30s and 40s but are now, in many cases, well past retiring age and still drive trains. If we said anybody over say, 80 has to prove they can drive a loco there would be an enormous outcry and yet if we mention letting young people drive it's a no no! Which do you think is safer youth or old age?

Of course the stopping of older members from driving is not considered, as most of our members are old, but I am sure from being involved with the motorcycle movement where we have international riders of barely high school age competing all over the world, that our youth are much more competent than we give them credit for and definitely capable of driving a model train.

So as a national policy, if we see a young kid interested, put him (or her) on the front and show him how it works and let him have a go with supervision. He may become interested and will turn up at our running days because he is participating. The same goes for older visitors — we have to encourage outsiders to our hobby.

If we don't, well we can all see what is happening... At many of our clubs the average age of members is well past retiring age and within a few years our numbers will start dropping dramatically. The cost of maintaining all the facilities like tracks, club houses, etc. will be left to a few old stalwarts who will not be able to generate enough income and the movement as we know it will collapse.

Ron Hewitt

Join us in a great hobby!

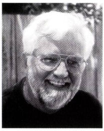
If this is your first issue of *Australian Model Engineering*, welcome!

In successive issues we cover many topics centred on that wonderful process of model engineering — alias *tinkering.*

If you're new to model engineering as well as to our magazine, you'll benefit from getting together with other model engineers — we're good at sharing ideas and saving each other money! If you don't have any contacts, start by looking in Club Round-up to find a club that's near to you. Many of our readers have discovered people with similar interests literally just around the corner.

Helping other model engineers is the simple idea of the volunteers behind this magazine. Our readers write items for us — for the same (non-existent) rate of pay! If you have ideas, opinions or techniques that you feel would be interesting to others (especially from the newcomer's angle), please drop us a line. We can send you a useful guide and help with preparing artwork or editing.

I hope you'll enjoy the great fellowship that makes our hobby special, and that you'll support our advertisers — after all, they help pay our bills!

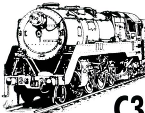


David Proctor

Managing Editor

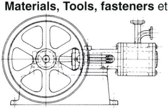
E. & J. WINTER
Model Engineering Supplies

An ideal start to the world of miniature steam...
Professional quality, fully detailed plans by Ernest Winter. Comprehensive casting sets for a growing range of Australian steam locomotives including: NSWGR 12, 13, 30, 32, 35, 36, & 38 classes; SMR 10 class; VR K class. All in the popular 5" gauge. NSWGR 36 class also available in 7-1/4" gauge.



C38

Stationary and Marine steam...
The entire works of O. Burnaby Bolton, 23 stationary and marine steam engines (incl. triple expansion engine). 13 IC engines and over 60 live steam locos from O to 7-1/4"g.
Materials, Tools, fasteners etc., for the model engineer.



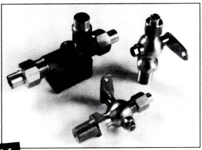
Plus More...
Plans from Nexus (*Model Engineer)* and Don Young.
Books from Nexus, TEE and Camden.
Castings for many Nexus and Don Young designs.

Send for our 44 page illustrated handbook just $7.00 posted.

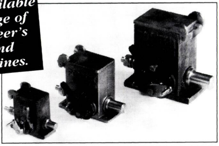
E. & J. Winter — Bolton Scale Models
PO Box 124, MEDOWIE, NSW, 2318
Phone & fax: (02) 4981 7999
e-mail: ejwinter@ozemail.com.au

LIVE STEAM MODELS
Fittings, Fasteners & Supplies

Offering a comprehensive range of model engineering materials:- • Valves • Water & Pressure Gauges
• Displacement Lubricators
• Injectors • Foster Lubricators • Oilers & Grease Cups
• Whistles & Sirens
• Unions & Nipples
• Rivets, Screws, Bolts.



Catalogue available with full range of model engineer's supplies and traction engines.



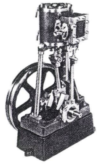
Send $10 Australian Dollar bills (or Credit Card details) to:

Live Steam Models Ltd., Unit 7, Old Hall Mills,
Little Eaton, Derbyshire DE21 5DN England.
Tel: 44-1332-830811 Fax:44-1332-830050
E-mail:livesteammodels@zetnet.co.uk
Web Site: www.livesteammodels.com

For your
MODEL ENGINEERING
requirements...

MATERIALS
Copper, brass, B.M.S., stainless, silver steel, in most shapes and sizes.

FASTENERS
Screws, nuts, rivets.



TAPS & DIES
BA, ME, Brass

FITTINGS
Injectors, gauges, valves, etc.

MACHINERY
A good range of pre-loved workshop equipment. New machinery also available.
A range of books and magazines are in stock.

EMCO MACHINE TOOLS
AUSTRALIA PTY LIMITED

2/247 Rawson Street
Auburn, NSW, 2144
Australia

Phone: (02) 9648 4377
Fax: (02) 9648 4150
ACN 002 506 139

M. B. M. MODEL ENGINEERING
IMPORTERS & SUPPLIERS OF MODEL ENGINEERING EQUIPMENT

Fittings, Nuts & Bolts, Taps & Dies
Write, Phone or Email for free Catalogue

STEAM OPERATED
WATER PUMPS

Suitable for 5" gauge loco Bore 1 in Stroke 0.875" Water 0.625"	Large 5in or small 7¼" gauge loco Bore 1in Stroke 1.25" Water 0.625"	Large 7¼" gauge loco Bore 1.375" Stroke 1.875" Water 0.750"

Telephone 09-235-2018
Fax 09-235-7537
E-mail jaws38@xtra.co.nz
PO Box 75-153, Manurewa, Auckland, NZ
http:/www.MBMModelEngineering.com

NSW Interclub Run - 31 May 2003

At the Sydney Live Steam Locomotive Society - West Ryde grounds

The SLSLS is proud to have initiated the Interclub Visits we all enjoy. But it has been many years since there has been an interclub visit at West Ryde. Since our last one in 1995, we have made a number of improvements to the grounds, including greening of the site. We have pleasant grassed picnic areas, as well as our three railways for the live steamers. No RSVP is needed, just come along and have a great day.

The Society will be having a display of members work in the clubhouse, always a good talking point, and visitors will find this a popular gathering place. Grounds open from 8am to 10pm. SLSLS has 5" ground level and elevated tracks, however, 2-1/2" and 3-1/2" gauge locos are especially welcome. Your club secretary has the full invitation. **Don't forget**: current boiler certificate and enclosed footware.

Entrance for unloading & loading is from Park Avenue, West Ryde.

Hobby Mechanics

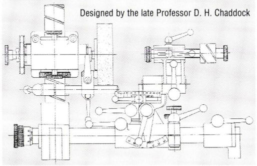
More Details on our Website:
www.hobbymechanics.com.au

Suppliers of Machinery and Tools for Working in Metal and Wood

By agreement with Model Engineering Services, Sheffield, UK, we offer components to build the world-famous

QUORN

UNIVERSAL TOOL AND CUTTER GRINDER



Designed by the late Professor D. H. Chaddock

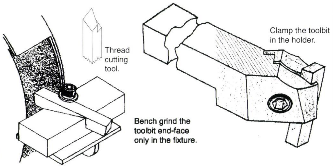
Perfect for the correct sharpening of milling cutters, lathe tools and drills, etc. We offer Australian-made castings combined with imported accessories. Both Mark I and Mark II styles offered. Please send S.A.E. for Details and Prices.

JOHN STRACHAN

HOBBY MECHANICS

P.O. BOX 785, KENMORE QLD 4069 • **Phone (07) 3374 2871**
• Fax (07) 3374 2959 • E-mail: jstrach@powerup.com.au

THE DIAMOND TOOL HOLDER

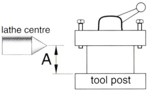

Thread cutting tool.
Clamp the toolbit in the holder.
Bench grind the toolbit end-face only in the fixture.

Each kit consists of the toolholder, grinding fixture, Tool Bit, **Allen key and** detailed instructions.

Type	L.W.H.	Dim A	Sq. tool bit	Price
T6	52 x 9.5 x 9.5	6mm (1/4")	1/8"	$99
A8	77 x 12 x 11.5	8mm (5/16")	1/4"	$125
A9.5	77 x 12 x 13	9.5mm (3/8")	1/4"	$125
B16	77 x 14.3 x 15	16mm (5/8")	1/4"	$125

Price includes GST & Post within Australia

Roughing and finish cuts, end and shoulder facing, plus 55 or 60 degree threading. All from a standard square HSS toolbit! Before ordering, measure the height from the tool-rest landing to the lathe centre (Dim A on sketch). Select the kit that suits your application.

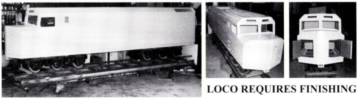


D & P BURKE TOOLMAKERS

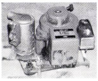
27 Woodstock Rd. Mount Waverley, 3149, Victoria
Phone (03) 9807 6316 Fax (03) 9807 9620
We accept Bankcard, VISA and MasterCard

BURKE-C7.CDR

FOR SALE 11" gauge RIDE-ON LOCO COULD BE ADJUSTED TO OTHER GAUGES

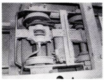


LOCO REQUIRES FINISHING



The power plant, is petrol/electric.

Motor is a 12 h.p. electric start
4 stroke
Generator is a 200amp d.c.
24 volt



Two bogie sets, partial view of one shown, all three axles are powered but centre axle is unflanged, as can be seen there are disc brakes, and two heavy duty electric motors per bogie, four motors altogether: two motors for forward and two motors for reverse. Each axle has roller bearings and are sprung, with cross frame adjusters.

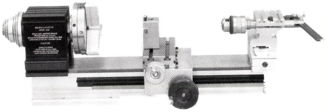
Loco design is for an American FP45, but could also be an Australian National DL
The two doors in the front are for the battery boxes.

THIS 11" GAUGE RIDE-ON LOCOMOTIVE HAS A STEEL FRAME, IS WELL MADE AND STURDILY CONSTRUCTED. 3000 mm long x 630 wide x 900 high (from rail) The assembly is in many parts, i.e.: two 3 axle bogies, chassis and body frame. The Body frame is covered in Masonite and mdf board. With fireproof bulkheads each end of driving position. This Loco will run on 25mm x 6mm steel strap with the same steel used as cross ties every few feet.

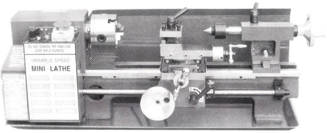
SALE PRICE: $9000 Aust.
Contact Bob on 0412 535900 or Darren on 07 38032487
Also comes with a Qld reg. Trailer

TAIG MACHINERY

Taig micro lathe 4 ½" $489.00
2 Year Warranty



Mini lathe 7x12" variable speed $920.00



Mini Mills also available

59 Gilmore Crescent
Garran ACT 2605

Ph: 02 62815 660
Fax: 02 6285 2763

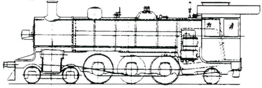
Email: k1ergo@netspeed.com.au

Hobby Mechanics

More details on our website:
www.hobbymechanics.com.au

Suppliers of Machinery and Tools for Working in Metal and Wood

We Supply Plans & Castings for Queensland Locomotives



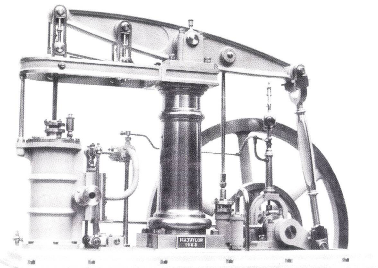
• QGR BB18-1/4 4-6-2 LOCOMOTIVE •
Built by Walkers Ltd. Marybourough Qld. 1959
The last mainline locomotive built in Australia

LOCO	NO. OF DRAWINGS	NO. OF CASTINGS
5" A10	12	76
5" A12	12	73
5" PB15	12	73
5" AC16	13	74
5" BB18-1/4	10	85
5" C17	6 (of 12)	57

Plans now available for A10 in 7-1/4" gauge

HOBBY MECHANICS
PO BOX 785, KENMORE QLD, 4069 • **Phone (07) 3374 2871**
• Fax (07) 3374 2959 • E-mail: jstrach@powerup.com.au

STUART MODELS
a Tradition



EMCO MACHINE TOOLS AUSTRALIA PTY LIMITED

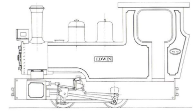
Have our latest **Stuart Models** Catalogue mailed directly to you for only $15

2/247 Rawson Street,
Auburn, NSW, 2144,
Phone: (02) 9648 4377,
Fax: (02) 9648 4150
ACN 002 506 139

We accept

• Stationary Engines • Marine Engines • Boilers • Steam Fittings • Fixings • Materials •

EDWIN



A freelance Fowler style 0-4-0 tank locomotive in 16mm scale for 32 or 45mm gauge

by Brian Wilson

Drawings and photos by the author unless otherwise indicated

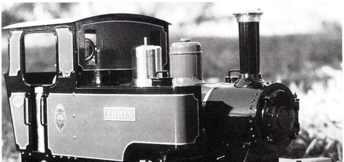
Introduction

After a remission of several years, the steam bug struck again. The symptoms were slow to reach their full intensity. It started with a glance at model engineering magazines in newsagents. Then a more prolonged reading of articles started, still in the newsagents. My wife noticed the occasional magazine on the coffee table and from there it was a short step to a subscription to *Australian Model Engineering.*

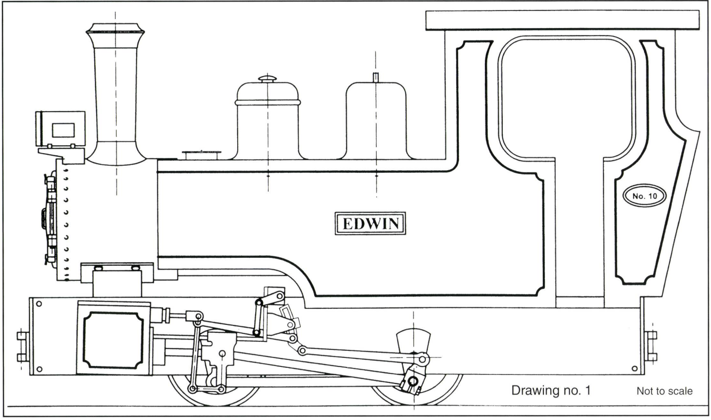
I had been through all this before and the end results were a 5 inch 0-6-0 tank engine and a 7˘ inch *Romulus.* These moved to other homes, and still languishing in the garage is a small launch engine waiting for a boiler (and a boat). The boiler and boat are quite large projects, so have remained at the planning stage.

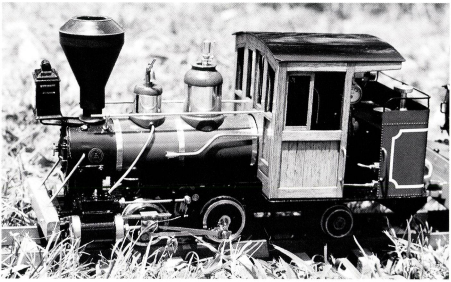
One of the projects to catch my attention in *AME* was the series on building *Bunyip,* the Fowler cane locomotive. Serious thoughts were entertained to tackle this engine as it has so many of the features that I like in a locomotive. However, as my workshop equipment consists of a Myford Super 7 lathe with a vertical slide to provide milling capability and a 12mm bench drill it would have been necessary to buy some bigger machines, or outsource all of the heavier work. As neither of these options appealed, I started to look for another more manageable project.

Besides machining capability, another important issue when choosing the project was time. Having undertaken some rather long tasks over the years, I was looking for something which could be finished more quickly. You seem to reach a point in life where you realise time is finite and so you try to fit a greater variety of things into it. It was at about this time that I started to become aware of an increase in interest in 16mm live steam garden railways, particularly overseas, but also here in Australia. I was not aware of any construction series in the popular model engineer-



The author's loco — you can have one like it at the end of this series





As you can see, the author made a pretty good job of his Baldwin Philadelphia, *which he bought as a machinist kit from Argyle Locomotive Works in Victoria* Photo: David Proctor

ing magazines, as there were for the larger gauges, but I noticed an advertisement for drawings and a machinists kit for a small Baldwin American outline locomotive from a supplier in Victoria, and I went ahead and ordered one.

This turned out to be an excellent kit, and the finished model is a delight to run, it showed me the pleasures and fun that can be derived from working in the smaller gauges. We all have our preferences however and two of mine are English outline locomotives and Walschaerts valve gear. When you have put a lot of work into the valve gear, it seems a shame to have it hiding under the engine where it can't be seen. One of the great delights of a steam engine is to watch the valve gear in motion, whatever the scale or gauge. The next locomotive had to be of English outline, with Walschaert's valve gear, and this is when *Edwin* was born.

Scales and gauges

The garden railways we are dealing with have a track gauge of either 32 or 45 millimetres (1˘” or 1∫”). These track gauges have been around for a long time and have been known as Gauge 0 and Gauge 1 respectively. As such, they have generally been used for models of the broad gauge railways which run on mainline tracks, and many different scales have been used. They have always been, and remain very popular with enthusiasts.

A separate concept is used, and appears to be of growing interest for modelling narrow gauge (2' 0" or 2' 6") prototypes. This is a scale of 16mm to the foot, which gives a working scale of approximately 1:19. Either 32mm or 45mm track can be used and the scale is close to and is compatible with LGB railways, rolling stock and fittings of which are readily available. The railways are often called SM32 or SM45 which simply means “sixteen millimetre scale, 32mm (or 45mm) gauge.

Narrow gauge railways were used extensively for all purposes, particularly sugarcane, logging and industrial haulage. Many are still in operation throughout the world and they possess a charm and character all of their own. It appears to be the modelling of these railways which has become popular in garden railways lately, and it is this concept which we are following with *Edwin.*

Objectives

The original idea was to design a basic locomotive, with a chassis which was reasonably simple and quick to make, which could then form the basis for a variety of body outlines and different boilers with various firing methods, such as gas, spirit or coal. In this case we have gone for a John Fowler style of body, and a gas fired boiler, which is quite easy to build. The design, although complete in itself, does not have to be slavishly followed, and is offered as a guide to this scale of locomotive and if desired, changes or improvements to style, workings or materials can readily be made to suit the builder. Some of these will be mentioned in the text.

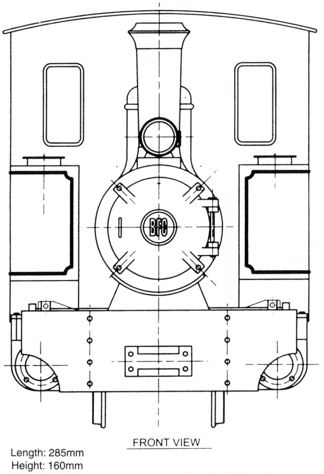
I am certainly not claiming to be an expert, and there will be many other approaches to the suggested methods and techniques described in the text. The methods the builder uses will depend on a number of things, such as experience, equipment, costs, etc. It is very important to use techniques which you understand and feel comfortable with, and at all times follow manufacturers instructions when using tools, equipment and machinery.

Units

The introduction of SI units many years ago has not always made it easy for the model engineer. Older machine tools are often graduated in Imperial units. Small taps and dies are still more readily available in Imperial, and often material sizes quoted in metric are really only conversions from inches. There is no need for it to be a big deal though. All that needs to be done when following a design is to use units for the equipment that you have, nearest to the size given, making sure that mating parts are compatible. A conversion chart of equivalents and tapping sizes, etc. is very useful for this, and should be displayed close by for rea.dy reference. My lathe, and most of my drills, taps and dies are Imperial, so Model Engineer and BA threads have largely been used. I believe these threads are still the ones most commonly used in the small sizes. Not too many different ones are needed anyway, and provided you don't break them, once you have them the cost is not too great.

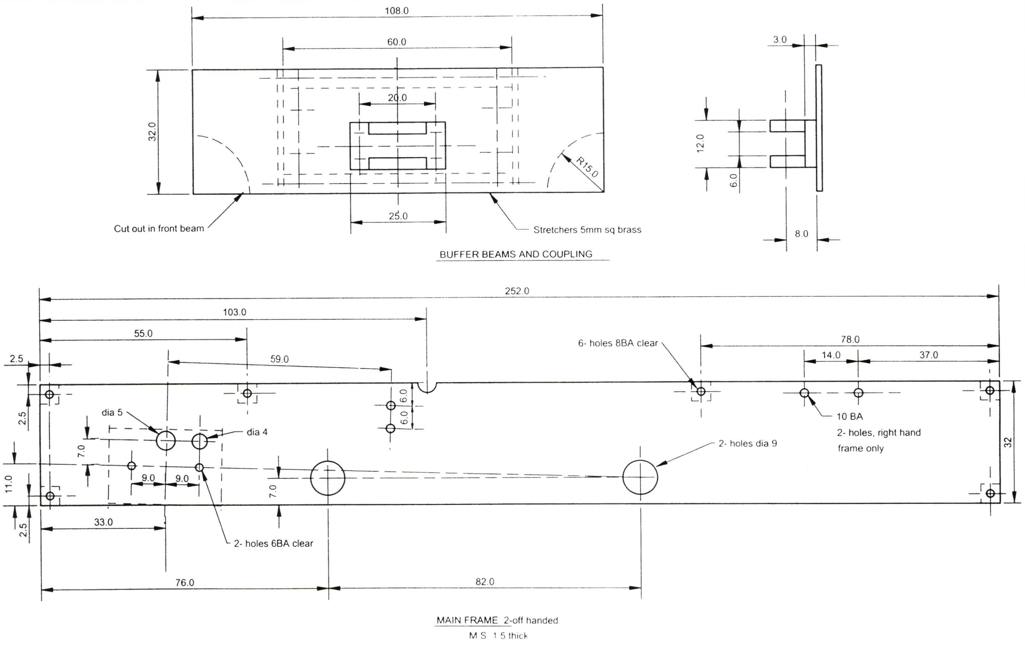
Equipment and materials

All the machining can be done using a drill press and a small



Length: 285mm
Height: 160mm
Width: 118mm

Drawing No. 2 Not to scale



Drawing No. 03

MAIN FRAMES

Scale: Full Size

lathe, preferably equipped with a vertical slide. A compound vice to bolt onto the drill press table is virtually a necessity and an adequate one can be purchased quite cheaply these days. If you have other equipment, such as a small vertical mill then so much the better. The usual hand tools will be needed and will be referred to in the text. An ideal heating source for boiler work and silver soldering would be a propane gas outfit with a range of tips, say a large, medium and pinpoint.

The entire engine can be made without castings, and from materials which may be in the scrap or off cuts bin. Lost wax casting, laser cutting, and etching of plates are processes which are particularly appropriate to working in this scale, and a lot of construction time could be saved by employing some or all of these processes, although unless multiple engines are being made, the extra expense may not be justified.

To help avoid breaking small taps, and to successfully use a small die, two essential items of equipment are a tailstock tap holder and a die holder. If you do not already have these, drawings are provided for a pair which will suit 8 and 10BA. (**See Drawing No. 24**). Construction of these is quite straightforward and suitable materials should be found in the off cuts bin, although if 30mm rod is not available, the diameter of the die holder could be made smaller. Because of the resulting shorter thread, more care would then need to be taken loosening the die locking screw when changing dies. Make sure that each holder is a free sliding fit on its mandrel.

One of the great things about model engineering as a hobby, is that each person can work to their own standard. Whilst normally a person will take as much care as possible to work accurately, we are not making Swiss watches, and steam locomotives are quite forgiving in their need for accuracy. In fact if tolerances are too fine, in some instances things can bind up, and certainly the prototypes were sometimes literally run into the ground with minimal maintenance often resulting in some very loose tolerances. However, when working in small sizes, care has to be taken when fitting parts, as an error of say 0.25mm would be 4% of 6mm, but only 1% of 25mm. Therefore in theory, tolerances have to be much less when working in smaller gauges, although in practice average care will produce a free and perfectly satisfactory engine, because when being used the loads on working parts are much less and total running times tend to be less, thus minimising wear and reducing the need for absolute precision.

Construction

With a few exceptions where parts have to fit together or be part of an assembly sequence, items can be made in any order at all. If you are a beginner, it is a good idea to make straight-forward pieces first, and then progress to more difficult items as your skills improve.

Remember that descriptions of how to go about making this locomotive are only suggested methods and there will be many other ways as good or better of making the parts and putting them together.

The frame assembly

You will need a piece of 1.5mm mild steel sheet sufficient for two frame pieces and two buffer beams (about 260 x 100), about 375mm of 5mm square brass, and 52mm of 12mm square mild steel. Taking the 1.5mm mild steel, make sure that one long edge is straight then with a try square check an end and if necessary, mark and file it square. Mark out the two frames and the beams, leaving sufficient clearance for the saw cuts. Saw out the pieces, file to the lines and finally draw file and de-burr all edges. The two frame pieces are now fixed together for marking out and drilling.

Coat the outside of the left hand frame with marking blue (a permanent felt pen can be used), then mark out and drill one of the 8BA clearance holes in the corner of each frame and clean out any burrs by using a larger size drill held and turned by hand. (Take care with sharp edges.) On the outside of the hole in the right hand frame, using the drill in the same way, make a small countersink and rivet the two pieces together. If a rivet is not available, an 8BA bolt can be used, cut off and hammered over as a rivet. (Alternatively the pieces can be bolted or super glued together.) Mark out and centre punch the hole in the opposite corner, carefully align the pieces, clamp in the drill press and drill 8BA clear. Place a rivet through this hole in the same way. Finally clean up so that the edges are together and smooth with no burrs. The remaining holes can now be drilled and tapped where necessary.

Before doing this (or making any component), we need to think about accuracy. Which holes, edges or surfaces need to be particularly accurate or true to each other? In this way we can ensure a well made model by making sure that critical fits are accurate. For example, with the frames, the most important holes to position precisely are the ones for the axle bearings. With the other holes, either their position is not so critical, or allowance can be made later to correct any misalignment. Further, the need for accuracy with the bearing holes, is that they have to exactly match the position of the holes on the coupling rods. It is not so much that they have to be exactly 82mm apart, but the spacing of the holes must be the same otherwise the rods will bind. Later we will be fitting the rods to the holes, but in the meantime, drill the holes as accurately as possible and here the use of a compound vice bolted to the drill press table would help.

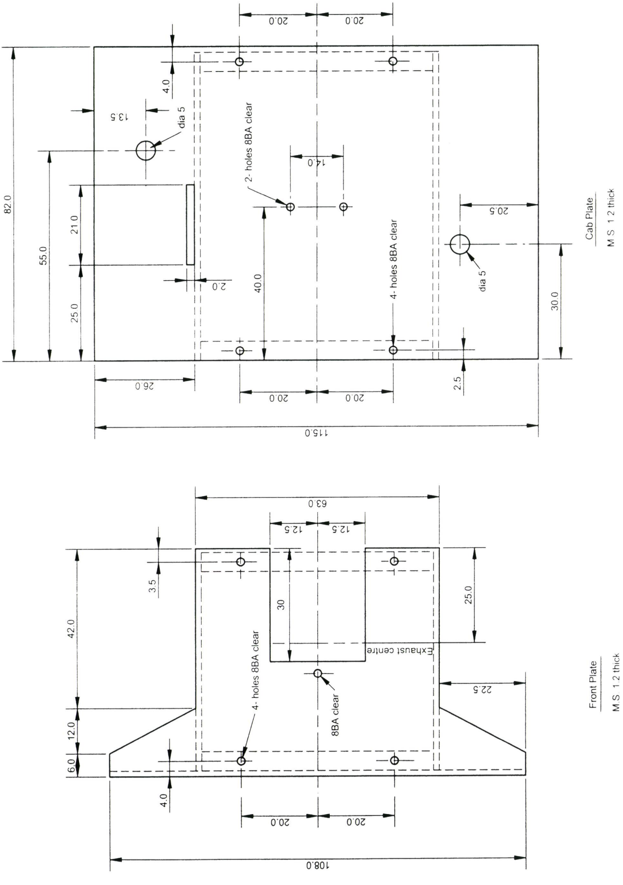
There are four 8BA holes in the frames, so now is a good time to think about tapping small holes without breaking the tap. There are several 8 and 10 BA tapped holes used throughout the model and if we keep breaking taps, then our day will be ruined. To successfully thread a small hole, we need:

(1) A taper and bottoming tap of good quality. (Cheaper ones are usually a poor investment and will almost invariably break).
(2) A drill of the correct tapping size.
(3) Lubricant (can be a specialist compound or ordinary oil).
(4) A tap holder which can be mounted in the tailstock or drill press chuck. (See drawings).

To cut a thread, firstly make sure the job is firmly clamped or held in a vice, drill the hole, and without moving the job, remove the drill bit from the chuck and grip the tap holder with the taper tap inserted. Apply some lubricant, and gently start the tap using only light finger pressure. As soon as the tap starts, reverse it for half a turn or so and then advance a small amount before reversing again. This process of advancing and reversing must be followed for the entire operation. Do it regularly, as if you go too far, the tap can jam and will break whichever way you turn it. As soon as the taper tap starts to get a bit tight, back it right out and change it for the bottoming tap. Go in with this until it too becomes tight then take out and return to the taper tap again. Throughout all of this you are only using the tips of your fingers. It may seem a little tedious, but I am sure you will agree it is nowhere near as tedious as breaking off a tap! Another consideration is that brass and bronze are much easier to thread than steel. Unfortunately the first holes we tap are into the steel frames, but if we survive these we should be right for the rest.

Cut out the buffer beams, clean up all edges, mark out and drill the holes then put to one side.

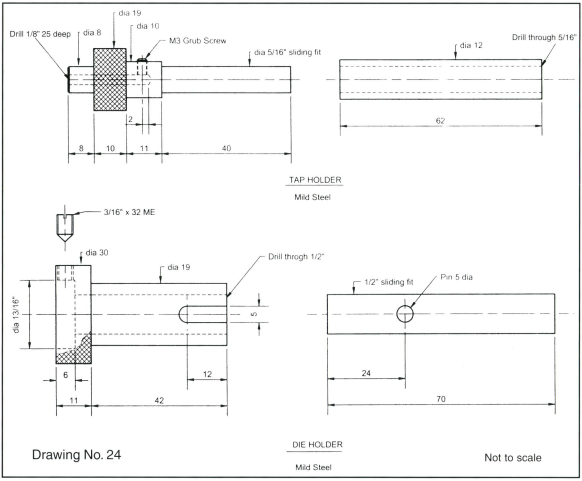
When making the six frame spacers, it is essential that they are all the same length. If you have a graduated handwheel on your lathe lead screw, this can be done by using a parting tool. Grip the square brass in the 4-jaw chuck and face off. (It is not necessary to have the material precisely centred for this). Loosen the jaws and move out just enough brass to allow the parting tool to clear the chuck when cutting off 60mm. Wind the parting tool to the end of the work and engage the lead screw. Move the tool by means of the lead screw handwheel until it just touches the end of the job and note the reading. Measure the width of the parting tool with a micrometer, withdraw the tool and wind it down using the handwheel a distance of 60mm plus the width of the parting tool and part off. Repeat for each spacer. (See diagram 1). Another way would be to have a stop held in the tailstock chuck. (A short piece of 10mm round would do). You would need to face and part off the first one to a mark on the brass, and then each one could be moved up to the stop and then parted off.



Scale: Full size

FOOTPLATES

Drawing No. 04



Drawing No. 24

To thread the ends of each spacer, it is necessary to have them accurately centred in the 4-jaw. The thread needs to be about 4mm deep. Thread each one as previously described, this time with the tap holder held in the tailstock chuck. It can save time when setting up repetition parts in a 4-jaw chuck to mark two jaws and only undo these each time the job is changed. Whilst the job still needs to be checked for accuracy, it is usually very close to centre using this method.

Bolt the frames together, coat the end spacers with marking blue on the outside faces and place the assembled frames down on a flat surface (drill press table, lathe bed or similar). Take the buffer beams and hold them in their position on the ends and using a 1.5mm drill carefully twist it in each hole to mark its location. Take the beam off and centre punch for drilling. As an alternative to rivets, you could drill and tap 4 x 8BA bolt holes in the spacers at the ends of the frames to fix the beams, but rivets have an authentic look and you can't break a tap when using them!

The couplings are a straightforward job and are fastened using 8BA bolts.

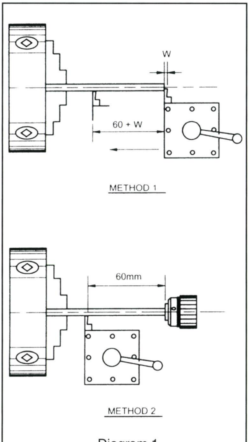


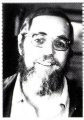
Diagram 1

Footplates

The footplates are made from 1.2mm mild steel sheet, making sure everything is square. The cut-out for the steam pipes on the front plate and the reversing lever on the cab plate can be cut out using chain drilling and filing. A needle file will have to be used on the cab plate slot, and as there will be many occasions when needle files are used, it would be worthwhile to have a good set. After the holes are drilled and all burrs are removed, coat the relevant frame spacers with blue, carefully position the plates on the frame assembly and mark through as before, using the 8BA clear drill. Drill and tap 8BA. To help make tapping easier, these holes can be drilled right through.

To be continued — and meanwhile here's a photo to tempt the taste buds!

Steam Chest



with Dave Harper

Hi there, steam fans, and welcome to another collection of steam stuff. The requests for beginners articles still keep coming, so it looks like I'd better do something about it!

It's all in the book!

Settling down for a browse through my library with these articles in mind, it struck me that about 99% of what I know about steam engines I learnt from reading books. I have to admit that travelling the world through space and time from the comfort of my armchair, through the medium of books, is more satisfying for me than standing at the lathe belabouring some poor undeserving lump of metal! I realise that this probably sets me apart from most model engineers, but that's never worried me.

When I became interested in steam engines, about 10 years ago now, I looked around for information, and, as is my wont, started collecting books on the subject. It soon dawned on me that the steam engine is a huge and varied subject, and my interest widened to cover the Industrial Revolution, for which the steam engine was literally the driving force. Consequently my library contains much historical matter, particularly biographies of the engineers who were responsible for that great revolution that continues to this day.

Another observation is that the best books on steam engines were published in the twenty years between about 1890 and 1910. This was of course the height of development of the steam engine and the beginning of the IC engine and electrical industries.

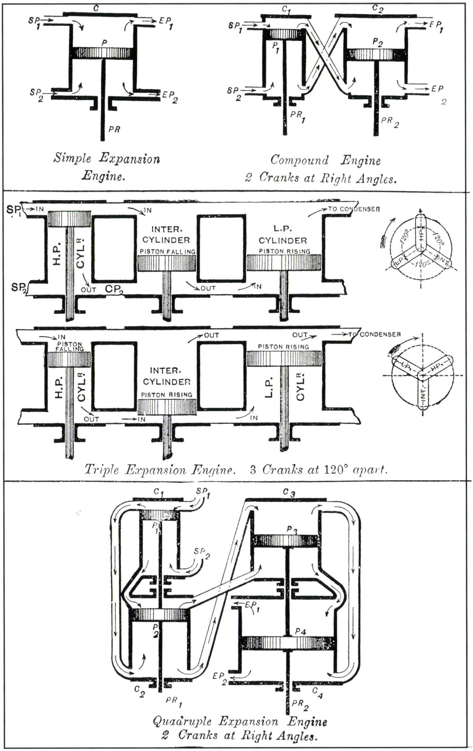
So my advice for anyone wanting to learn about steam engines is to read some books!

What I propose to do is to take excerpts from some of the books in my collection to illustrate the basics of the steam engine, and to give details of the books that are still available as reprints or may be available in second handbook shops. Unfortunately prices of these old books have gone way up in recent years, but searching the internet can sometimes turn up a gem at a reasonable price, particularly if you don't mind a book that's a bit old and battered.

Ask the professor!

One of my favourite authors of the period in question is Professor Andrew Jamieson M. Inst. C.E. I was lucky enough to find a copy of the 1906 edition - the eleventh edition! - of his *Elementary Manual on Steam and the Steam Engine.*

In a wonderful gesture, several years back, I was sent a copy of the professor's Textbook on *Steam and Steam Engines including Turbines and Boilers,* 17th edition, published in 1910. This volume, the follow-on to the *Elementary Manual,* was sent to me by Joe Huntley of the Lake Macquarie Live Steamers as the society felt I was better suited to care for this valuable book than they! I was greatly touched by this gesture, and keep the volume among my most valued books.



Simple Expansion Engine.

Compound Engine 2 Cranks at Right Angles.

Triple Expansion Engine. 3 Cranks at 120° apart.

Quadruple Expansion Engine 2 Cranks at Right Angles.

Figure 1

So, between these two books alone, I have enough material to keep me going for quite a while!

Lesson number one

As a first instalment, I've chosen to answer one of the questions recently raised by a newcomer to steam, namely, what is meant by compound, triple expansion, quadruple expansion engines, etc?

The accompanying diagram, (**figure 1**) taken from Professor Jamieson's *Elementary Manual*, illustrates the different types very clearly. The reason for all these various types of engine comes down to the search for efficiency. To get more work from a given amount of fuel, the higher the temperature, and thus the pressure, of the steam in the boiler can be raised, the more energy it contains. However, to extract all that energy requires the temperature to be lowered again by expanding the steam back to as near atmospheric pressure as possible.

Note that in the diagram SP means steam pressure and EP is exhaust pressure, the arrows indicating the direction of the flow.

Once pressures got above about 100-150PSI (pounds per square inch) it was found that the steam couldn't be expanded sufficiently in one go without incurring more losses through thermal inefficiencies in the cylinder. If you want to know more detail, you'll have to make a nodding acquaintance with that feared subject, thermodynamics.

Suffice to say, for now, that expanding the steam a second time in a larger cylinder extracts more energy from the steam. As steam pressures went up, made possible by better materials for boilers plus a better understanding of the design for high pressures, the steam was expanded three, and sometimes four times to extract the most energy and thus achieve the highest fuel efficiency.

These extreme methods were driven by the marine engineers mostly, as shipping companies have always tried to screw the last cent from their fuel costs in that most competitive of industries. However, the textile industry wasn't far behind, and many later textile engines could almost have been lifted straight out of a ship.

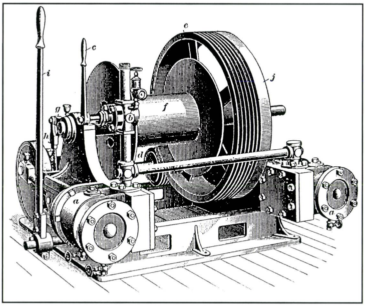


Figure 2

Many variations on a theme

The four arrangements shown in the diagram are by no means the only ones used! There have been many and varied arrangements of cylinders used, but the ones shown are the most common.

Incidentally, to answer another question, if the left hand half of the Quadruple engine as drawn was used by itself, it would be called a tandem compound engine. The low pressure cylinder is typically nearest the crankshaft.

Another common way to increase efficiency was to exhaust the lowest pressure cylinder into a condenser. Here the steam was condensed by water cooling, and the resulting condensate returned as hot water to the boiler. This system was used all the time on ships, as they had to conserve their fresh water supplies as much as possible. It was early found that salt water and boilers didn't go well together!

When the steam is thus condensed, it reduces the pressure almost to zero, i.e. a vacuum. This effectively gives an extra 14.7PSI pressure to the steam, this being the average atmospheric pressure at sea level.

This brings me back to the very beginnings of the steam engine, the atmospheric engine of Thomas Newcomen, which started the whole thing off on the early 1700s. I'll go into that next time.

Further reading

There are two books on steam and the steam engine still published in Australia.

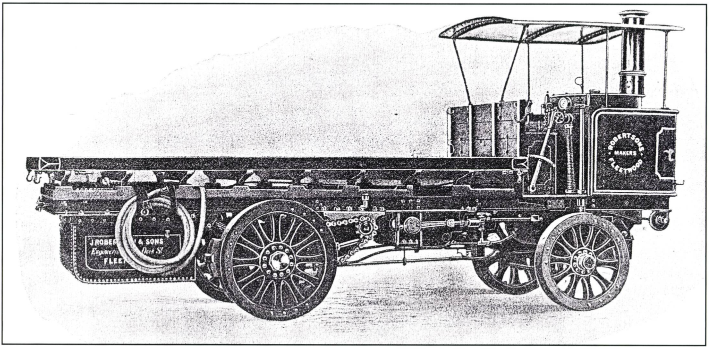


Figure 3

The cheapest and best for our purposes is *Guide for the Boiler Attendant's and Engine Driver's Certificates*, by A E King, and published by E W Cole. It is available through Plough Books for around $30 and is a very good introduction to the subject.

A more advanced volume is simply called *Steam*, by E C Reid and J C Renshaw, and is also published by E W Cole. This book is aimed more at power station engineers, and covers more modern boilers and steam turbines. It also costs around $80-100!

A very good little book which seems to keep turning up in second hand bookshops is *Duncan's Steam and Other Engines.* First published in 1907, it was still going after WWII, my copy being dated 1947! Published by Macmillan & Co., it shouldn't be too hard to track down a copy.

Lindsay Publications, of Bradley, Illinois, USA specialise in reprinting old books on technology. They have a very good website and online catalogue, but a number of their titles are also available through Plough Books. *Steam Engine Design* is a reprint of an ICS textbook first published in 1896, and gives a very good and readable description of a basic steam engine and how it works. It even has an ISBN no — the key indexing system worldwide for identifying books. It is 0-917914-10-4, on my copy, anyway. At around $20 it is a very good book.

Hidden treasure!

Mention of ICS (International Correspondence Schools) reminds me that they published many excellent textbooks around the 1890 - 1920 period, and these often turn up in bookshops. They cover a huge range of subjects, sometimes in a seemingly unlikely combination, but I've collected a number over the years and all are full of good information.

Looking through my files for a suitable example of the material available in the old ICS books, I dug out a set of copies sent to me a while ago by old friend Arnold Thuys, on Auxiliary Marine Machinery. In amongst the steam winches I found something I'd never noticed before — a friction drive hoisting winch! This uses the same drive system as my sole attempt at a model steam engine, which was based on a full size hauling winch in the Boiler House Steam and Engine Museum, Petrie, Qld.

The drive from the engine crankshaft to the hoisting drum is via two cast iron wheels with matching V shaped grooves (See **figure 2**). The long lever **i** on the left operates through link **h** and arm **g** to turn the eccentric bearings of the drum shaft, forcing the grooved wheels into contact, and driving the drum, when the lever **i** is pushed forward. When this lever is pulled back it tightens the strap brake around the drum **j**. Very simple and foolproof! This looks like it has the potential to be a simple winch to model, as there are no gears involved. Aluminium plate could be used for the frames, as I used in my model, and a couple of suitable cylinder castings from a model loco would do. Any takers?

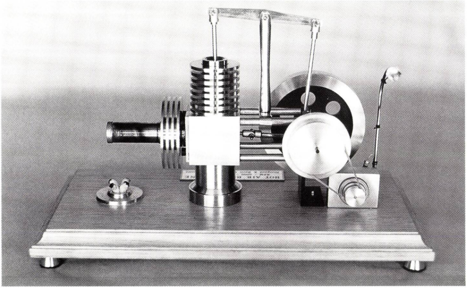


Photo 1

Reading for model makers

There are a number of books available on model steam engines, and I think the first one any budding ME should acquire is Tubal Cain's *Model Engineer's Handbook*! I imagine this book would be available from most ME suppliers, and is a mine of useful information — even my copy is getting dog eared through use!

Tubal Cain has also produced two excellent books called *Building Simple Model Steam Engines*, vols 1 and 2. These contain all the information needed to build a number of simple model engines and the boilers to power them.

TEE Publishing produce a large number of books of interest to us. On a recent visit to my friends at Minitech I noticed they are now carrying quite a number of titles. One that caught my eye was *Model Stationary Engines, Their Design and Construction.* This seems to be a reprint of a much older book, but it covers many of the questions newcomers to steam are likely to want answered. For just over $20 I reckon it would be a great investment.

I'd suggest that collecting catalogues from all the suppliers who advertise in *AME* would give any beginner a good idea of what books are available. If you belong to a model engineer society, ask around the members for their favourite book — in fact I'll do that too! Any reader who's stuck with me this far, and has a book on steam engines that he thinks beginners should know about, please let me know what it is. Then I can pass it on.

Then there's the internet

The internet is a great source of information on steam engines, and Steve Craven of Loddon Miniature Steam Locomotive Soc. Inc. kindly emailed me about the Great Western Archives site www.greatwestern.org.uk which has a basics section that takes you through and names all the parts of a locomotive — sounds like a good place for someone just starting out! Here endeth the lesson.

More steam wagons

I'm still finding more strange (to me, anyway!) steam wagons from the stuff that Tony Little sent me from an old book he acquired recently. **Figure 3** is a nice engraving of a Robertson 5 ton steam lorry. They must have been real boneshakers on the old cobbled streets! I'm happy to pass on any requests for more information to Tony — unfortunately email hasn't reached him in

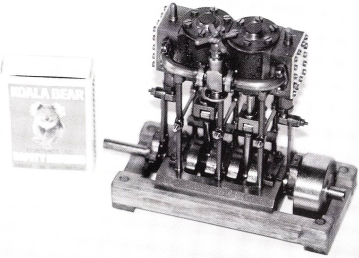


Photo 2

far-off Chillagoe yet.

Another gem from Edwyn Jones

Not many photos to share with you this time (hint, hint!), but **photo 1** is another of Edwyn Jones' ingenious hot air engines. This one operates through a beam just to be different — the drive cylinder bore is 13mm, the stroke 20mm. The displacer cylinder is 16mm x 20mm. The flywheel diameter and the beam length are both 90mm. This is one of a range of kits now available through Minitech and Edwin himself, and which are apparently proving very popular.

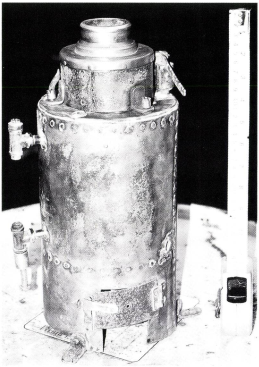


Photo 3

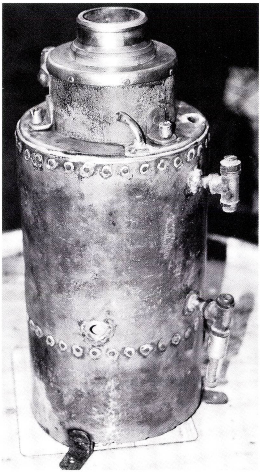


Photo 4

News on the "mystery model"

Back in the Jan/Feb 2003 issue we published a couple of photos of a little vertical boiler and engine that belongs to Dave Marsh of Victoria (Photos 6 and 7, P16). Dave has since emailed me to that he's been told the model is a Doll brand. Further information came from Keith Hartley, also from Victoria, who sent me a photocopy from a 1930s catalogue put out by The Meadmore Model Engineering Co of Melbourne.

The illustration in the catalogue, sadly not suitable for reproduction, looks exactly like Dave's model, and the description is as follows: A vertical steam engine complete with vapourising spirit lamp, steam whistle, steam regulator, cylinder lubricator, feed pump, safety valve and water gauge. The boiler is a blue oxidised centre flue type banded with nickelled strengthening bands and set on a cast iron base. Engine is double acting, slide valve, very powerful.

The prices are staggering by todays standards — No 3, 11$^3/_4$" high, without feed pump - 75 shillings, and No 2, 13" high, with feed pump was 95 shillings! (That's $7.50 and $9.50 for those too young to remember....) That must have been a long time ago!

Thanks for the information, Keith.

Yet another mystery engine

Yet another engine photograph has been sent to me for identification — this time by Alan Harris of NSW. It's a tiny twin cylinder open column engine that was found in an antique shop. It apparently spins freely and is very well made. Can anyone tell us what it might be? **Photo 2** is the one to look at.

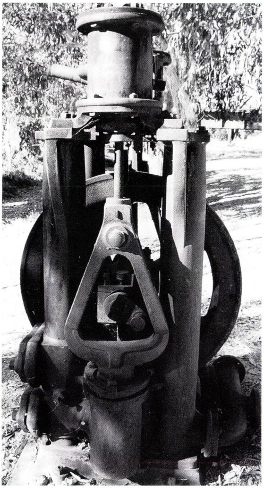


Photo 5

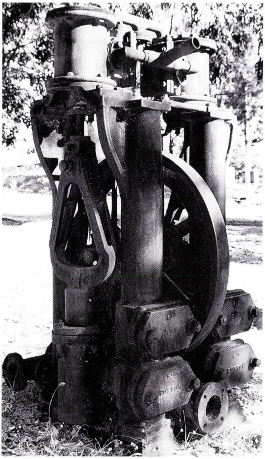


Photo 6

Saved by the bell!

In the nick of time a bundle of photos arrived from Allan McGrice way up in the Northern Territory. On a recent trip to South Australia Allan picked up an old copper boiler of unknown origin. He hopes one of our readers may be able to identify it as he plans to restore it some day.... I'd be checking with a boiler inspector before steaming it, Allan! Anyway, **photos 3 and 4** are of the boiler in question, which does indeed look as if it's had a hard life.

Allan describes it as follows: "the boiler is basically of copper construction with some brass fittings, e.g. relief valve, water level indicator and the very top section which I would presume held a chimney. The lower section of the chimney section is secured to the main lower section by three screws and is made of iron riveted together with copper sheet over the top, to which the brass top piece is attached by internal screws.

The relief arm is marked at each notch $17^{1}/_{2}$, 22, $26^{1}/_{2}$, 31, $33^{1}/_{2}$, 40, presumably PSI and for the attachment of a weight. (*The graduated arm can be seen in* ***photo 3...*** *dh*)

The whole thing measures 14 inches high and 6 inches diameter. I cannot find any marking on it, and it may be home made. In my previous encounters with model steam stuff I haven't seen anything quite this big."

Any of our boiler buffs have any ideas?

Allan also sent some photos of an unusual steam pump he saw in the small town of Pine Creek in NT. It stands about 5ft high and has no identifying marks. **Photos 5 and 6** show two views of the pump which appears to be a back-to-back twin banjo pump, presumably used for pumping water at the local gold mines. Can anyone name the maker? Thanks for your timely offerings, Allan.

George Watkins remembered

Many readers would be familiar with the wonderful photographs of George Watkins. He travelled all over Britain between 1923 and 1980 photographing stationary steam engines in every location imaginable — mines, mills, factories, breweries etc. etc. Several books of these photographs, together with explanatory notes, have been published, and more are currently being printed.

A while ago I was delighted to receive in the mail a substantial A4 sized book published by the International Stationary Steam Engine Society. I had been a member of ISSES until a year or so ago, and I had been aware that the Society had for many years been trying to publish more of Watkins' work from the huge collection of material left when he died in 1989.

Their efforts have finally borne fruit, and the volume I received was one of the journals due to me during my membership. Owen Peake, the Australian contact for ISSES, kindly sent me the volume, for which I am truly grateful! The book, the first of a planned series on George Watkins, is titled *Biography, Reminiscences and the Early Articles.*

The contents follow exactly that pattern, and I found the whole book absolutely fascinating. I was so impressed that I asked Owen if copies were available to non-members, as I feel that this material should be more widely known.

I've just heard back from Owen, who tells me that copies of the volume I have, which is actually ISSES journal No 13, for 1997, are available for £14 sterling, roughly $A39.

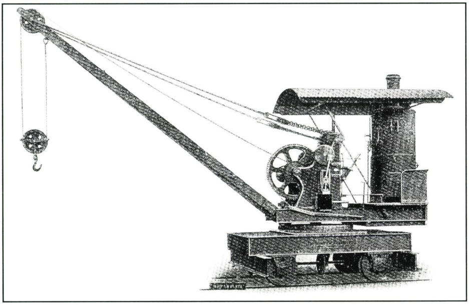


Figure 4

Other volumes due sometime are No 16 on the Soho Foundry at £15 and No 17 containing several articles will also be £15.

I suggest anyone interested in obtaining copies or more information on ISSES contact Owen Peake at:

owen_peake@octa4.net.au

or GPO Box 1781, Darwin, NT 0801.

Thanks Owen, and keep up the good work.

I've run out of space again!

It looks like Allen Stayt's reminiscences about the sugar mills will have to be held over again, sorry about that Allen!

To help make up for the excess of my ramblings and the shortage of photos, I've dug out another nice engraving of a steam railway crane from among the pile of stuff sent by Jim Libby. This looks about as simple as such a device could be, but still a challenging model subject! Has anyone ever seen a model like this? See **Figure 4**.

That's all for now, until next time, happy steaming!

Dave's email address is:
sandave@bytesite.com.au
or write to him via AME

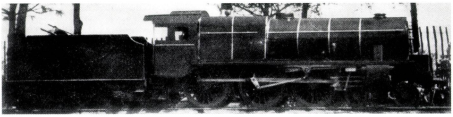
Whatever happened to these locos ?

In the July 15, 1949 issue of *The Locomotive Railway Carriage & Wagon Review* there is an article about an order for six $10^{1}/_{4}$" gauge models, being close copies of the 'Royal Scot' class locomotive, which were being built for Australia.

They were constructed by Carland Engineering Co Ltd in Essex, UK, and at the time of the article one was being test run under steam and the other five were near completion. The order also included 30 articulated coaches.

The photo is of the one being steam tested and the same photo appeared in Carland's advertisements at the time.

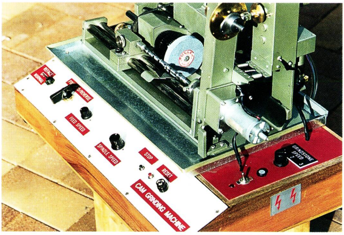
Did these locomotives ever make it to Australia and if so, where did they operate? Presumably they would have arrived late 1949. Did they all go to one owner? If anyone knows of them and their history we would love to hear about it!



A Cam Grinding Machine

Designed and made by the author, George Punter

Photos by Stephen Waite and George Punter



It all looked quite simple at the time, as all I needed to do was to extend the tailstock on the cam-grinding machine and then grind the cams for the cylinder four-stroke engine that I had been making.

I had already made a cam grinder but due to the length of this particular camshaft it would not fit between the centres. After much thought, I decided that rather than extend I would rebuild the machine. The original had done good service but thirty years of use and wear were beginning to have an effect on the accuracy. I had the idea that the new machine would be semi-automatic in that it would shut itself off when one cam had been ground to size.

Needless to say very little of the original machine is left. I still use the three speed food mixer motor to drive the grindstone but have added two other motors — one to turn the camshaft and master cam (by chain) and the other controls the speed and movement of the pivot action. Both of these motors which came from old photocopiers, are geared down to very low rpm. On the old machines these functions were hand powered.

The basic idea can be thought of as a small lathe bed, which is pivoted along the length of the bed. The headstock is extended up to carry the master cam on a shaft, which is driven at a ratio of 1:1 by a chain from the headstock spindle. The distance between the pivot point, "lathe" centre and master cam is a ratio of 4:1 and the master cam is made four times the size of the cam being ground.

In use the camshaft blank, which is to be ground, is held between centres and driven by a dog clamped to the shaft and driven by a small catch plate mounted on the headstock. When the power is switched on the three motor units work the following:-

(1) The grindstone rotates.

(2) The headstock spindle carrying the camshaft to be ground rotates, as does the master cam on the top of the headstock.

(3) The follower that the master cam rests against begins to move very slowly back, allowing the grindstone to come into contact with cam blank — due to the pivot action. The follower shaft has an adjustable stop, which contacts a micro switch and turns the whole unit off when the cam is the correct size.

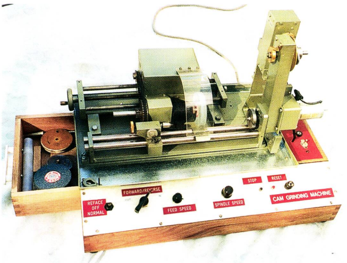
It all sounds very complex but in reality it isn't and it does work! After a cam has been ground and polished to size the grindstone, which is mounted on a table, can be traversed parallel to the camshaft by the hand wheel on the left-hand end of the machine. The machine is capable of handling shafts up to 250mm long and cams 20mm dia.

I use an angle of 110 degrees between the apex of the inlet and exhaust cams. Investigation has shown that in car engines this angle can vary from 101 degrees to 114 degrees. There may be some engines that exceed this but most of the model internal combustion engines described in *M.E.* and *StrictlyI.C.* use the angle of 110 degrees.

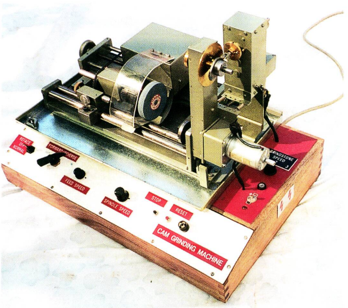
Sample model I.C. cam angles and follower diameters.

Engine Name	Capacity	Exhaust Cam	Inlet Cam	Follower Dia.
Kittiwake	15cc ohv	135	125	3/8"
Kinglet	5cc sv	120	110	1/4"
Kittyhawk	30cc ohv	135	125	3/8"
Seal Major	30cc sv	130	120	1/4"
Wallaby	30cc ohv	125	115	5/16"
Mastiff	30cc sv	120	130	1/4"
Chaddock Spec.	5cc ohv	160	160	?
Seagull	10cc sv	130	120	1/4"
Dolphin	10cc ohv	135	125	3/8"
Kiwi	15cc ohv	130	122.5	5/16"
Seal	15cc sv	130	120	1/4"

All of the above engines use 110 degrees between cam apexes.



General views of the complete machine showing the storage drawer housing spare grinding wheels and cam profiles.



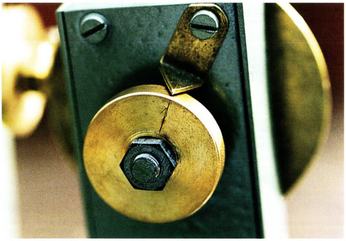
I have made a series of master cams for this machine with different angles and lift heights and these can be used to give various valve over laps (when both valves are open at the end of the exhaust and beginning of the inlet stroke). The master cam is set to the correct angle on the timing disc at the top of the headstock. This disc is interchangeable and can be replaced with timing for single, twin, three or four cylinder engines.

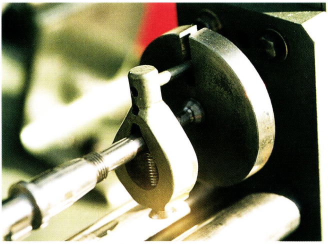
All of the electric motors have speed control. The food mixer motor (240V) has its control built in, but the others are controlled by Dick Smith kits which give 12 and 24 volt pulsed power. This means that the units still have good power even when going slow. All of the A/C mains power is housed at the right hand end of the base unit in a separate chamber for safety reasons. The low powered DC units are housed in the sloping front under the control panel. All of the circuits are fused. The motor that controls the pivot action (feed motor) has forward and reverse so that it can be reset for the next cam to be ground. There are stop and reset buttons. The latter is used after the unit has shut itself off after completing a cam. The switch on the left hand end of the machine is used to operate the grindstone independently so that its surface can be re-dressed without the rest of the machine going.

The base unit houses a drawer that contains timing discs, master cams, spare 50mm and 75mm dia. grindstones and a diamond wheel dresser.

Jeff Jorgensen, a qualified electrician, gave advice on circuit design and construction and checked all electrical work for safety. He also produced the circuit diagram and descriptive notes.

To help with cam design I have made a drawing board unit, which is used to change the rotary motion of a cam into a linear motion. It uses a 24 D.P. gear and rack and is similar in shape to a tee square. The gear engages the rack and as the cam rotates it pushes against a spring loaded cam follower that houses a pen and so producing a linear trace. This means that both the shape and height of the lift are visible to scale on the paper, as is the amount of valve overlap. Any modification of the master cam can then be seen on the trace. It also shows the effect of different types and sizes of cam followers. I have both roller and flat faced cam followers of a scale size that fit this unit. As with the grinder there is a timing sector plate with the angle of 110 degrees engraved on it so that the cams can be set to the correct angles.

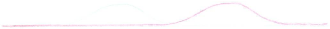

The setting point used as a reference when setting up the machine to grind a cam

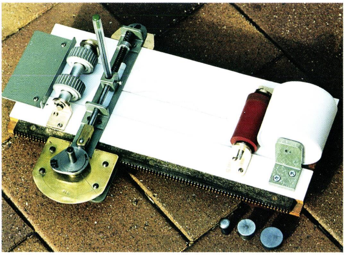

The driving dog used to provide drive to the camshaft when set between the centres of the machine

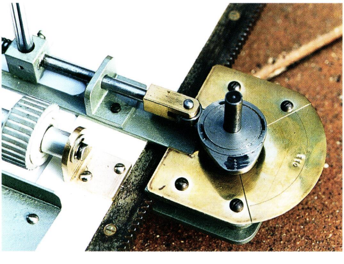
The machine is now finished and has been used to produce a cam in order to check the settings and viability of the machine. It has been an interesting project to work on and has involved a great deal of problem solving (inspiration at 2 am!) The cost has been kept low by the use of recycled parts and materials. The next stage is to grind the camshaft for the three cylinder water cooled side valve engine and that is where we came in!

Notes on parts

Transformer, bridge rectifiers and fuses were selected to operate with the motors used in this machine. The use of the many other types of motors would mean possibly reassessing the ratings of the above.


A sample of the cam trace as drawn by the machine shown. A transparent overlay is used to show the degrees of duration of the cams and the height of the lift


Two views of a machine used to plot the linear path of the cam profiles. The trace can be seen on the paper and shows both the amount of valve lift and overlap. The paper roll is mounted on the right hand side and ffeds through 'oneway' rollers to keep the paper in position when in use.

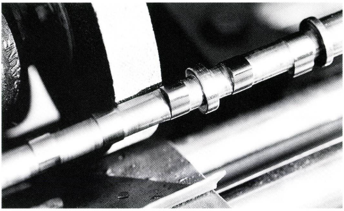


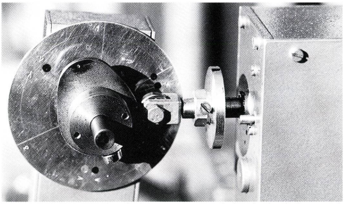
Start switch	N/o momentary contact (DSE No. P7560)
Stop switch	N/c momentary contact (DSE No. P7561)
Transformer	12 to 30 Volt @ 2A (DSE No. M1991) (Used 12 and 24 tappings)
Bridge rectifier-1	2W06 2A (DSE No. Z3308)
Bridge rectifier-2	P04 6A (DSE No. Z3306)
Speed Control-1	DC motor controller kit (DSE No. K3070)
Speed Control-2	DC speed control kit (DSE No. K3072)
Relays K1 and K2	SPDT 8V to 12V dc (DSE No. P8008)
Relay K3	Because of the isolation required between the low and high voltages, an industrial type relay was used here. Types such as Omron are available through Electrical Contractor wholesalers. SPDT minimum with 24V dc coil.
Fuse Holder-1	DSE type 3ag (No. P7916)
Fuse Holder-2	DSE type 3ag (No. P7902) Different types of holders were used so that there was no confusion between High and Low voltage fuses. Also the Fuse-1 type requires the use of a tool to remove.
Limit Switch	Standard type micro switch with N/c contact.
Micro Switch-1 & 2	(for building reversing switch) standard micro switch with Common N/C and No contact (changeover type)

Operation of Cam Grinder Control Circuit

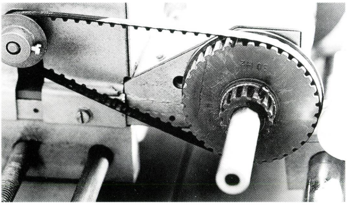
With reference to drawing, as power is applied to transformer, the two rectifiers are powered up so long as **F2** and **F1** are OK and the **Limit** is closed as shown.

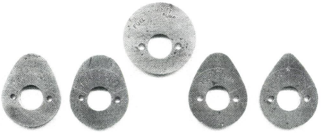
Pressing the **Start** button will bring in relay **K1** and **K2** coils. If the dry run On-Off switch is closed then **K3** will energise also. **K1-1** contact is also a hold-in for the **K1** coil, i.e. 12 volt to the coil will now be re-directed through **K1-1** contacts as the **Start** momentary contact button is released.





A cam profile at the head of the machine and also the backplate used to set the angles of 110 degrees for each of the cams. On the righthand side is the roller follower and the microswitch and plate.





Sample cams as used on the cam grinding machine and on the plotter. These are pairs of inlet and exhaust cams and also a petrol pump cam. A common centre boss is used and this allows the cam blanks to be made of $^{1}/_{8}$" BMS.

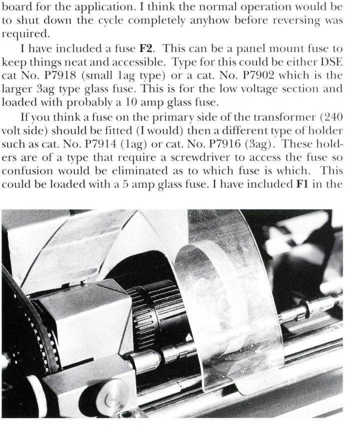
The **Spindle motor** and the **Grinder motor** will now run and by selecting either **Forward** or **Reverse** on the **Feed motor**, it will also run.

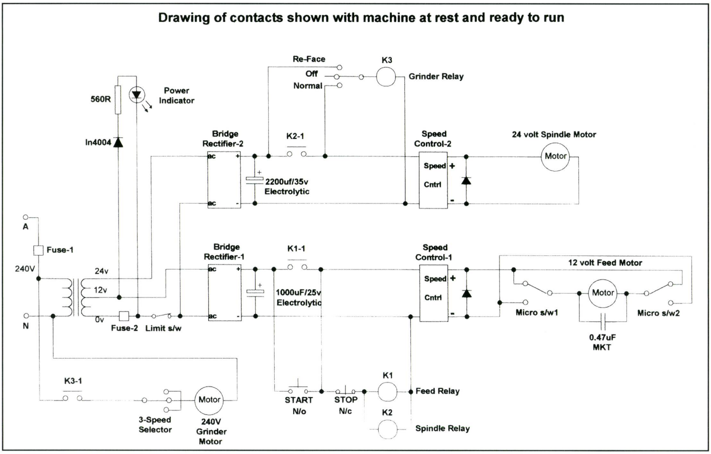
Pressing the **Stop** button at any time will cease all operations as will the operation of the **Limit s/w** or if the control fuse **F2** should blow for any reason.

The **Feed Direction** switch can be operated at any time and will not affect any shut-down. It would be recommended to allow the **Feed motor** to come to a complete stop before selecting any directional changes. This could be avoided by the use of additional circuitry in that section but it would be getting a bit overboard for the application. I think the normal operation would be to shut down the cycle completely anyhow before reversing was required.

I have included a fuse **F2**. This can be a panel mount fuse to keep things neat and accessible. Type for this could be either DSE cat No. P7918 (small 1ag type) or a cat. No. P7902 which is the larger 3ag type glass fuse. This is for the low voltage section and loaded with probably a 10 amp glass fuse.

If you think a fuse on the primary side of the transformer (240 volt side) should be fitted (I would) then a different type of holder such as cat. No. P7914 (1ag) or cat. No. P7916 (3ag). These holders are of a type that require a screwdriver to access the fuse so confusion would be eliminated as to which fuse is which. This could be loaded with a 5 amp glass fuse. I have included **F1** in the





drawing. Make note where the tap for the 240 volt grinder motor goes, i.e. the load side of **F1**.

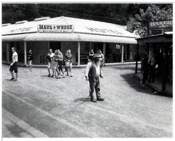
Finally make certain that the case is adequately earthed and that all 240 volt terminals are shielded from contact. They may be in an enclosed case but there are times when access to these areas is required to test for faults with power applied.

NOTES:-

START	Momentary contact N/O push button
STOP	Momentary contact N/C push button
K1	
K2	
K3	12 volt DC SPST relay
F1	Panel mount fuse holder with 10 amp glass fuse.
F2	Panel mount fuse holder with 5 am glass fuse.
BR1	Bridge rectifier
BR2	Bridge rectifier
SC1	Speed Control unit
SC2	Speed Control unit

Micro Switch 1 and 2 must be changeover type i.e. must have a common N/O and a N/C contact.

Limit micro switch can be single throw i.e. Common and N/O contact only



15th Australian Miniature Traction Engine & Road Steam Rally

at the historic

Timbertown Heritage Village, Wauchope, NSW

17th — 19th October, 2003

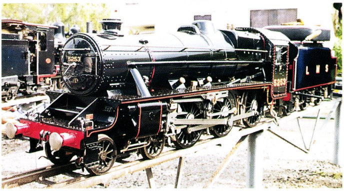
Timbertown, set amongst 87 acres of picturesque natural forest in the heart of Wauchope, is an entire village, re-created to demonstrate the struggles and achievements of our pioneers. The village and oval makes a wonderful venue.

A scrumptious sit-down dinner for Saturday night is available on site in the Timbertown Hotel and Function Centre which is also licensed. There are nearby Motels, Caravan Parks for accommodation. Limited 'Bush' camping may also be available.

For full details on the Rally, etc....
Contact Paul Stanley, phone (02) 6587-5188 or email: stanleymob@aol.com

Lake Macquarie

Rain on Friday, overcast on Saturday and wet on Sunday, but did it matter? Not a bit! It was like a convention with somewhere around 100 locos in attendance and people from many clubs and several states. All gauges were represented, but the 5" brigade had the edge with numbers. Saturday was the busiest day by far and Sunday was spoilt by some serious rain. The pictures on these two pages should help to convey the atmosphere as everyone celebrated an important milestone for the members of the Lake Macquarie Live Steam Locomotive Society.



This fine 7.25" Black Five belongs to Hugh Whitmore of Sydney SME

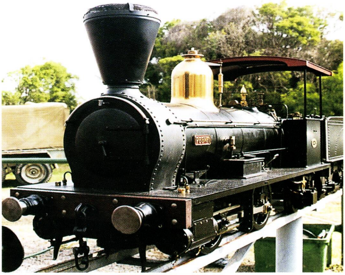
Bob Rottenbury's Decauville Linda *is well-known around the tracks*

John Wakefield gives his 7.25" SAR 2-10-4 class 22 a good run

This 5" gauge DH73 belongs to Don Hinchcliffe from the QSMEE.

Len Whalley's outstanding 5" CLP featured in AME a few issues back

Down from Brisbane are Lloyd Dannenberg and his QGR PB15



Eric Evans' magnificent QGR A10 is impressive in 7.25"

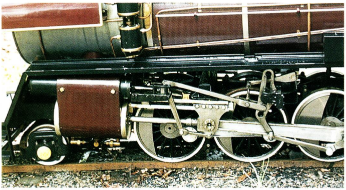
Celebrates 50 Years

Photos by David Proctor unless otherwise credited

Two 5" gauge Fowlers — Ray Bannerman and Ross Bishop double head with a load of narrow gauge freight stock (and 1 pasenger)

Bob Hesse from Canberra with Ian Smith's well-known Bunyip

There aren't many gatherings without John Steadman Photo: R Sharp



A closer look at John Wakefield's big South African Photo: R Sharp

Kevin Hyde from northern NSW is equally at home on the track as when driving his Stanley Steamer.

It wasn't all locomotives — this 7.25" tanker was standing in a siding

Warren Starr from Queensland with his 5" C38 Photo: R Sharp

Universal Test and Demo Stand for Locomotives — part 4

by Peter Dawes

Appendix 1 — Chains

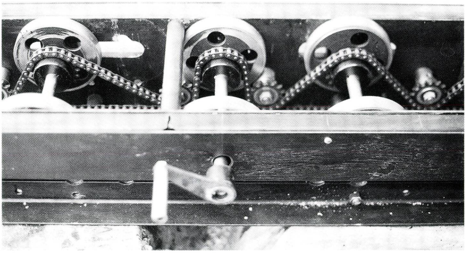
To calculate chain lengths, use the standard formula quoted in the Ruberg and Renner catalogue. Note that the same formula in a Maxton catalogue has been printed incorrectly.

CL (in pitches)= (N+R)/2+(2*CD)/P +((N-R)/2/π)^2*P/CD

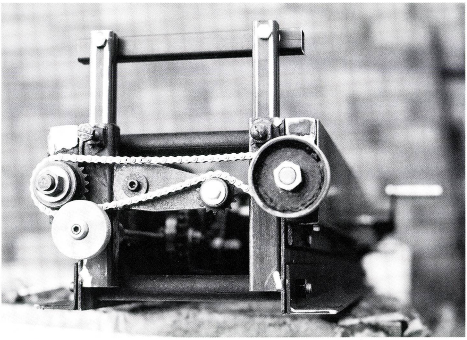
where **CL** = chain length in No. of pitches; **N** = No. teeth in driven; **R** = No. teeth in driver; **CD** = centre distance (inches); π = 3.14159; **P** = pitch in inches; ^ means "raised to power of"; / means divided by, and * means "multiplied by".

The formula uses a few approximations but is said to be fairly accurate.

This formula and the more complex complementary one for finding the CD given CL, have been put into two very short computer programs called CHAINLEN.BAS and CENTRDIS.BAS respectively (both with .EXE versions). The CD formula especially, is too tedious to do even with a calculator. It contains multiple brackets and a square root term. I think it's almost guaranteed to end up with errors! Few people will get it right first time, I'll wager. I had to have a few tries just to get it right in the computer program. But at least now the correct answers come up instantly.



View of centre axle + chain + handle. Side cover covers axleboxes



Rear end view with stanchions in place and cover removed to show $^{1}/_{4}$" pitch chain

The following hints might be found useful:—

1. A 'normal' (full pitch) joiner requires an ODD number of pitches in the chain to start with.

2. The normal joiner adds ONE unit to make it an even number of pitches.

3. If there is an EVEN number of pitches to start (the two ends will be opposites, i.e. a narrow + a wide), then a half link joiner is required. This joiner has a new main pin with a tiny split pin to lock it.

4. Normal full joins must be in units of two pitches (or links) or they will require a half link joiner.

5. NB: A half link joiner also requires a 'normal' joiner to complete the join.

6. A normal joiner adds one pitch length to the length and half links add two, because they add one themselves and require a normal joiner as well.

7. Lengths calculated in "pitches" must be rounded UP to the nearest whole number. Remember that a 'normal' joiner adds ONE to the count so allow for it when calculating lengths.

8. To shorten a NEW piece of chain you have to take account of the type of its ends.

9. If shortening an existing chain by TWO pitches, and one that is already joined with a normal joiner, simply cut out two links.

10. If it has to be shortened by ONE pitch then take out THREE links and add TWO back in, i.e. a half and a 'normal'.

11. If it has to be shortened by THREE pitches then take out FIVE, and add TWO back in, i.e. a half and 'normal'.

12. To calculate the slack, subtract the calculated number of pitches (the fractional length in pitches) from the next highest whole number, which will be the actual final physical length of the chain. This difference gives the fraction of a pitch length by which the chain will be slack. If under 0.1 the chain could end up 'tightish'. If around 0.2 it should be just right. If over 0.4 it may end up sloppy. This refers specifically to $^{3}/_{8}$" pitch chain but could well be true for other pitches.

The chain will loosen up by a small amount in use so don't start off with it sloppy. For fast running, chains must be given the optimal amount of slack. For slow work, it won't matter a great deal.

Appendix 2 — Toothed Pulleys

The dimensions of the blanks for making toothed pulleys, are specifically for "L" size or $^3/_8$" pitch; (Ref: Goodyear). All units are inches and dimensions must be followed closely or the drive may be rough and unsatisfactory:-

PCD of pulley = NumTeeth x $^3/_8$ / pi.

OD of blank = PCD - 0.030

Depth to cut teeth = .075 + correction for pulley diameter (as measured from OD circumference).

Included angle formed by the sides of the groove = 40 degrees, same as a V-belt (there is disagreement about the exact angle in the references.).

Width of base of the groove (width of tips of teeth of belt) = .128 (*EIM* says .1395")

Radii of all corners = .020

Stock widths are $^1/_2$, $^3/_4$ and 1" (13, 19 and 25mm).

The main trouble is that different sources quote different figures for depth of tooth. *EIM* page 44, July 1988 Vol. 10 No. 2 adds a correction to the base figure of .075 for a $^3/_8$ inch pitch belt depending on the diameter of the pulley, and gives an angle of 18 degrees each side rather than 20. They add 18 thou for 1.5" diameter pulley, 9 thou for 2", 5 thou for 4", 2 thou for 8" diameter and so on. Yet these do not fit the belts that I obtain. I found I needed to add 25 thou for 2" and 3" diameter pulleys.

David Piddington in *EIM* May 1992 gives 15 degrees each side for metric belts.

The *MEW Data Book* in issue No. 51 gives some figures too.

The *Goodyear PDL* booklet gives 20 degrees per side and just .075" depth for the BELT and with a fixed .105" +0-.005 depth for the PULLEY teeth. That gave the best results with the belts available to me.

So I am going to buy out of this argument except to say that the depth does have a big influence on how well the belt meshes. I ended up having to index one pulley three times, going a few thou deeper each time before I got satisfactory meshing. Then I made subsequent pulleys the same at .105 +0,-005.

The Hoover $^1/_2$HP washing machine motor with a cast iron 13T pulley fitted plus Silicon Chip phase speed control

Belt guide flanges should be fitted on one, or better, on both sides of both pulleys. They can be made from 24G galv. steel or 16G (1.6mm) steel or aluminium, extending about 6mm ($^1/_4$") beyond the teeth and should be flared slightly outwards. In the case of thin sheet metal do this by "spinning" the rims against a bevelled hardwood former. For thick flanges machine the flare in the lathe.

The width between the flanges must be wider than the belt so if the pulley is the same width as the belt then space the flanges out slightly from the faces of the pulley and be sure to set the tracking carefully when setting up.

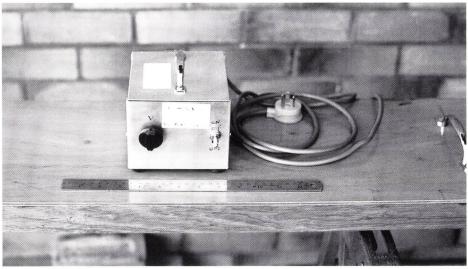
Appendix 3 — A Low Voltage Power Supply

Walters: For a general purpose variable DC supply you cannot do better than the Walters high efficiency switch mode circuit in *Silicon Chip* June 1997 and available as a kit (K3072) from Dick Smith stores for $22. To run it off the mains, extra parts are required. Choose those to suit the voltage and current requirements. A full-wave rectifier for 400V, 8A (KBPC804) costs $4. An 18V/6A transformer (M2000) and a case (such as H2330), power cord, DPDT switch, circuit breaker, and other small parts, are extra. The transformer at $46 is the most expensive item. All-up cost will be under A$100.

The circuit is a variable voltage design using MOSFETS that can supply up to 24 volts at up to 20 amps — with a suitable transformer or with storage batteries. The variable voltage provides speed control for DC motors. It also features "soft start".

Inductive spike suppression to protect the FETS is by means of an ESSENTIAL, but not supplied, fast recovery high current diode reverse connected across the motor terminals, plus a polycarbonate capacitor of 0.22uF in parallel (supplied). The motor leads have sufficient inductance to limit the effectiveness of the diode if it is not close by, so the diode should be right at the motor terminals or even at the brushes themselves. The diode (BYW8IP-200 rated at 200V, 15A) has to be ordered and costs about $5. The only justification for not supplying it in the first place is that it is not needed on resistive loads such as lamps.

Reversing would be by a separate heavy duty low voltage DPDT switch (not described in the article), and this does raise a problem with the diode which must always be connected across the supply leads in opposite polarity. So for a reversing system the diode would have to go on the supply side of the switch where it is slightly less effective. There is not much we can do about that. It also means we should put the reversing switch close to the motor, much less convenient than on the main p/s box. I put mine in a separate diecast aluminium "Jiffy box" screwed directly onto the motor body.



Plywood cover with DC power supply built from kit

The capacitor is not polarised so can stay close to the motor.

Another improvement option is to add one or more LC filters on the output to filter the supply both ways (not described). However big spikes are best handled by a diode and it must be a fast diode if it is to protect these fast MOSFETS. General purpose rectifiers are NOT adequate. It should be rated for the same or higher current than the motor.

This power supply should be suitable for driving any low voltage DC electric motor that itself is suitable for the test stand.

A voltmeter is not needed but may be useful in other applications. There should be a 1A fuse on the input, optionally a 10A circuit breaker on the output (or one rated to suit the motor), a mains power ON switch with neon lamp or LED, a roughly calibrated potentiometer to set the voltage, and of course the reversing switch (but see comments above).

The power supply can also be used with a storage battery, to produce a variable voltage up to 12 volts for blowers etc. It could also be used with two batteries in series. In these cases the transformer and rectifier obviously aren't needed.

Plywood cover

Bibliography

Test Stands:

1. W Shellshear; *AME*, January et seq, 1989.
2. A. W. Smith; *ME*, 3rd Sept 1956.

Dynamometers:

1. The October Experiments; in *Live Steam*, by Chris Leggo in approximately 14 episodes; October 1989, Vol. 23 No 10 et seq. He deals with the general subject of engine measurement, indicator diagrams and dynamometry etc.

   Seventeen references in *Model Engineer* just since 1989 came up on searching the author's computer index for "dynamometer". There are over forty in the Mitchell and Wilkinson index going back to the first issue, but it gives no details, making checking a monumental task.

   Too numerous to list, many references pertain to dynamometer cars per se but contain information of relevance to transducers, drawbar pull, power measurements, IMLEC, etc. Some of the significant ones are:-
2. Digital Dynamometer - This series by Andy Fremont in four parts is a good starting point for further study - Pt 1 appeared in *ME*, page 84, 19 January 1990, Vol. 164 No 3865. Then he made another contribution in Issue No 3881.
3. Bristol's 7$^{1}/_{4}$" dynamometer car was described in *ME* in a series starting on 3rd April, 1992, Vol. 168 No 3918.

   Some writers have written in disputing some of the formulae used in articles, so the subject is by no means straightforward.

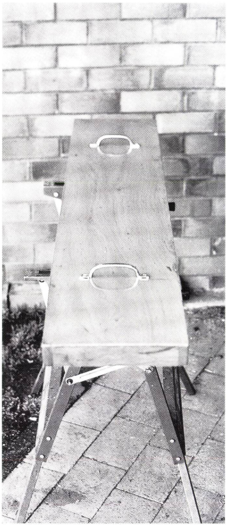
Motor Wiring:

- See *Sparks 'n' Arcs*, *AME* Nos 84 to 88, by Stan Allison for principles of low voltage motors and more details on wiring. Much the same principles will apply here except in the case of 240VAC systems.
- Low Voltage DC Power Supply for Motor Driving: Walters, R. *Silicon Chip*, June 1997.

Electric Motors:

Old washing machines contain a remarkable assortment of useful high quality parts and there is one machine with a four pole induction motor of about $^{1}/_{4}$HP with a high quality, integral 14:1 worm reduction gearbox that would be ideal for a fixed speed Demo drive (original machine unknown but wreckers might know it). Induction motors cannot be used as generators or brakes so it doesn't matter that it has a worm reduction box. It has A-section pulleys, so the output to the UTS would have to be changed to a toothed belt or light chain drive with a ratio of about 4:1 to obtain a suitable final speed and torque.

I have ended up (much later) installing a permag printed circuit motor of 80 watts made by Yaskawa of Japan. It was over 30 years old so is unlikely to be obtainable now. It had a built-in 100:1 spur gear reduction box so that I actually had to step up the speed to the UTS by about 2:1 with the toothed belt drive to the middle axle.



Plywood cover on the stand

Unfortunately, that ratio generates too much resistance for braking or for dynamometry but it makes an excellent variable speed drive for Demo mode when used with the above power supply. I only need to remove the belt to disconnect it for Test mode operation.

- Curtis, Shelley: *Operating a Three Phase Machine on Single Phase Supply*; *MEW* November 1999, Issue No 62, p27.

Toothed Belts:

- Torus: *EIM*; page 44, July 1988, Vol. 10 No 2.

Acknowledgement

I want to thank Rex Swensen for doing the CAD drawings and for the time he spent liaising with me over them.

Computer programs

The computer programs CHAINLEN.BAS and EXE and CENTRDIS.BAS and EXE, referred to in Appendix A, are available from the AME office. Send in a blank 3.5" diskette or alternatively, if you are "connected' we can email them to you.

A new construction series starts in the next issue

Steam Power

Its evolution, application and the traction engine — part I

by Ken Preiss

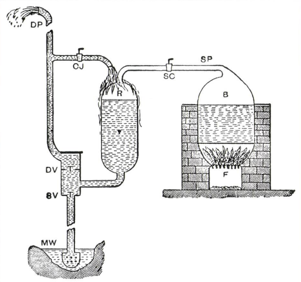
Having spent considerable time over the years from 1976 successfully building a one-eighth scale model of the *Royal Chester* traction engine I became captivated by the history of steam power and its application. Consulting some of the excellent books available and various web sites I have covered almost 250 years of history from the end of the 17th century to the early 20th century.

Early endeavours

In 1682 it is recorded that Sir Samuel Morland (1625-95) demonstrated to Charles II, who had an interest in novel inventions and devices, "... a new invention for raising any quantity of water to any height by fire alone." An incomplete sketch exists of a piston in a closed cylinder moved by steam from a boiler but there is speculation and doubt about the veracity of his part in the invention of the steam engine.

A Huguenot, Denis Papin (1647-1714), was familiar with air pumps, the inherent power of a vacuum, and even of the use of gunpowder to force the air out of cylinders. In 1690 he wrote: "I conclude that machines could be constructed wherein water, by the help of no very intense heat, and at a little cost, could produce that perfect vacuum which could by no means be obtained by gun-powder." He built a model to demonstrate his idea but did not pursue the idea further.

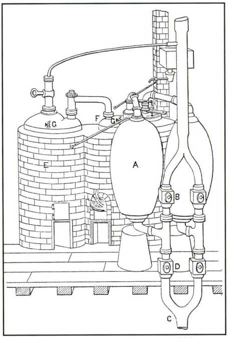
These early endeavours were more scientific toys than practical devices. The first documented evidence of a full size working steam pump to raise water from mines followed a patent granted Thomas Savery's in 1698. The use of this pump was so successful that patents were extended to run until 1733. It was a temperamental device, worked by hand controls that had to be operated in a strict sequence. It operated through the suction caused by a vacuum being broken and partly by direct steam pressure. It was capable of raising water about thirty feet. The steam engine was the direct result of further development of these early steam pumps.



SAVERY'S ENGINE, 1698.

F for Furnace.
B ,, Boiler.
S P ,, Steam pipe.
S C ,, Steam cock.
R ,, Receiver.
M W for Mine water.
S V ,, Suction valve.
D V ,, Delivery valve.
C J ,, Condensing jet.
D P ,, Discharge pipe.

Diagram of Savery's 1698 Pumping Engine



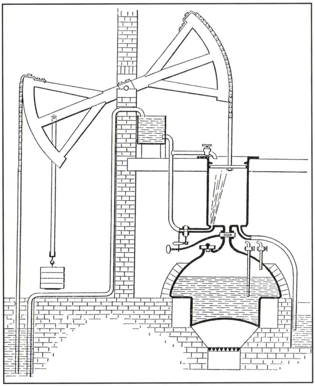
Savery's Pumping Engine, 1698

Newcomen's atmospheric engines

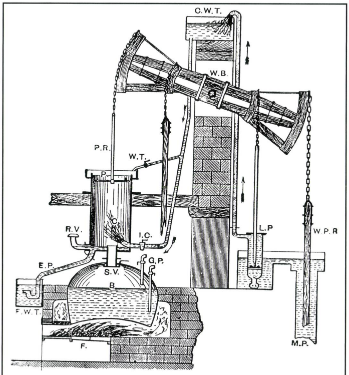
Thomas Newcomen (1663-1729) was a working craftsman familiar with the problems of de-watering mines, and he worked doggedly for ten years to produce an engine to overcome this problem. However, as a contemporary of Savery he was somewhat cramped in his work by his patents. The best-documented date for Newcomen's first engine, working in Staffordshire, is 1712, although one may have operated in Cornwall between 1710 and 1714.

A striking feature of these engines was a beam pivoted at its centre. One end of this was joined to heavy pump rods descending into the mineshaft and the other connected to the piston by a rod. With the piston at the top of its stroke, steam was admitted to the enclosed space below the piston. Then, by opening a cock, a jet of water sprayed into the cylinder condensing the steam. This caused a partial vacuum under the piston allowing the air pressure acting on the top surface of the piston to force it down thereby raising the pump rod. With the piston at the bottom of the cylinder the weight of the rods pulled it to the top of its stroke and the process was repeated. These steam devices were variously known as atmospheric engines (because the power strokes depended on atmospheric pressure), beam engines, and as single-acting engines because the power stroke was only in one direction.

While Newcomen's first engines were



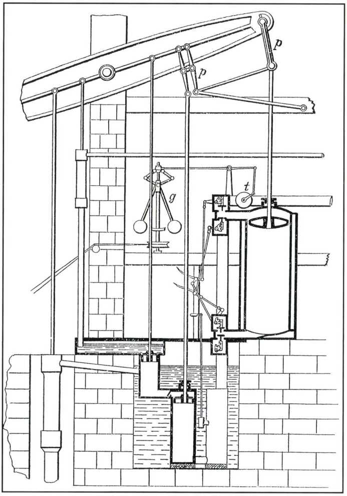
Newcomen's Atmospheric Engine, 1705



NEWCOMEN'S ENGINE, 1712.

F	for	Furnace.	M P	for	Mine pump.
B	,,	Boiler.	L P	,,	Lift pump.
G P	,,	Gauge pipes.	C W T	,,	Cold water tank.
S V	,,	Steam valve.	W T	,,	Water tap to top of piston.
C	,,	Cylinder.	I C	,,	Injection cock.
P	,,	Piston.	R V	,,	Relief or snifting valve.
P R	,,	Piston rod.	E P	,,	Eduction pipe.
W B	,,	Wooden beam.	F W T	,,	Feed water tank.
W P R	,,	Weighted pump-rod.			

Newcomen's Engine of 1712



Watt's Double-acting Engine, 1782

practical and met a need in removing water from mines they had hand-operated controls and were inefficient in terms of coal consumption. Thomas Smeaton (1724-92) improved the operation, reliability and mechanical efficiency of the engines, although surprisingly he never adapted them to produce rotary motion.

Watt & Boulton's steam engines

James Watt (1736-1819) understood the weaknesses, and more importantly the wastefulness in terms of coal consumption, of these early atmospheric engines. He improved the efficiency by a factor of eight and made many other improvements.

In 1763 he realised that, because the cylinder was alternately heated and cooled, there was an unnecessary loss of heat. To overcome this he fitted a separate compartment in which the steam used to create the vacuum was condensed. John Roebuck, a chemist and ironmaster, supported him financially in 1768, but the experimental engine did not run well because some of the materials used were unsatisfactory.

By 1774 Watt had moved from Glasgow to Birmingham and began working with his new-found business partner Mathew Boulton. Here he successfully rebuilt two single-acting experimental engines fitted with cylinders accurately bored on a canon lathe.

Double-acting and compound engines

Around 1782 Watt made two important improvements that developed side by side. He enclosed the top of the cylinder and passed the piston rod through a gland to seal it. By feeding steam in at slightly above atmospheric pressure the first double-acting engine with two power strokes was created. This was the first important step in developing a successful mechanism to convert the reciprocal motion of the piston rod to rotary motion. Together with these innovations he devised a linkage, today known as Watt's linkage. This arrangement of links, in the form of a parallelogram, allowed the piston rod to move along a true straight path through the gland. Previously, in single-acting engines, the piston rod had rocked back-and-forth at the end of the beam. This same linkage is still used today on the suspension of some racing cars.

Under fluctuating loads a constant speed was required to satisfy mill owners and to prevent damage to the engines. In 1788 Watt met this requirement by adapted a centrifugal governor as used in corn mills. It consisted of two metal balls held in place by jointed rods, and as the device spun the balls moved in or out and adjusted the throttle to give the required pre-set speed.

To give customers an idea of the power of his engines Watt rated them in terms of the number of draught horses required to do the same amount of work — hence the familiar term horsepower. A royalty of £5 was charged for these units of power. Although the term horsepower has been dropped, Watt's notion of a unit of power and his work is perpetuated in the kilowatt.

In 1799 William Murdock, the Watt & Boulton's representative in Cornwall, patented a slide valve that became a standard fixture on many subsequent Watt and other engines. Earlier engines had valves operated by levers actuated by projections on a vertical rod worked from the beam. To start the engine these valves were hand-operated.

Between 1785 and 1800 Watt and Boulton had supplied 110 engines with rotary motion to textile mills. The high cost of the engine and engine house were balanced successfully against the profits from improved efficiency. From the 1790s it was found economy could be improved by adjusting the valve timing to cut off the steam before the piston reached the end of its stroke and thus allowing the expanding steam to continue acting on the piston.

Some ten years earlier Jonathan Hornblower had patented an engine with two cylinders. This used the expanding steam exhausted from a small high-pressure cylinder in a larger low-pressure cylinder. These were known as compound engines and were later to develop into triple and quadruple expansion engines, widely used in marine applications and reaching their zenith around 1900.

Nineteenth century improvements

After 1800 other inventors continued to make improvements. The wider use of metal, in favour of wood, was adopted allowing the parts to be machined more accurately. Engines were becoming more compact. In 1807 Henry Maudslay designed a table engine that did away with the rocking beam by introducing a crosshead running in a guide. This allowed the piston rod, moving up and down in a straight line, to be connected (by a connecting rod) to a crank on the flywheel. These features were of particular value to marine engineers who were looking for a compact design to fit inside ships' hulls.

There would have been no need to reverse reciprocating engines, nor little point in reversing early rotative engines where a crossed belt would serve when the need arose. As rotative engines became more widely adopted the need to reverse, particularly on early locomotives, became more pressing. With the invention of the slide valve around 1780 the means to reverse were at hand. Early practice was to stop the engine and manually adjust the valve timing by undoing a clamp bolt and rotating the eccentric some 180º.

A simpler method was to use a slip eccentric. This was a free fit on the crankshaft, able to partially rotate, the amount being limited by a pin in a slot. To reverse, the engine was stopped, the flywheel rotated by hand in the required direction, and the regulator opened: the eccentric rotated, or slipped, to the opposite end of its travel thereby reversing the engine.

A better method to reverse the engine, and while it was running, was invented in 1842 by William Howe, a foreman working in Robert Stephenson's locomotive works.

Mounted on the crankshaft were two eccentrics, a forward and a reverse, at approximately 180º. Coupled to these were rods attached to either end of a slotted link. Joined to the valve rod by a clevis and pin was a block free to slide in the slot. By a lever and rod arrangement the driver could raise or lower the link causing either the forward or reverse eccentric to act on the valve rod. Intermediate positions gave a neutral, or allowed for more efficient use of the steam under certain conditions.

This device was fitted to a locomotive in 1842 and is now known as Stephenson's Reversing Link Motion. It was widely adopted and used on locomotives until the end of their era.

Gradually it was realised that it was not necessary to mount the cylinder vertically and from the 1820s direct acting engines were built with the cylinder set horizontally. However the most important advance was the successful utilisation by Richard Trevithick of steam at a pressure well above that of the atmosphere.

High-pressure engines

Jacob Leupold (1674-1727) of Leipzig experimented with high-pressure steam in 1725. He was unsuccessful, as the technical ability to build strong enough boilers did not exist. James Watt harboured a lifelong suspicion of the explosive force of high-pressure steam and actively discouraged its use. This however did not prevent pioneers like Richard Trevithick (1771-1833) from Cornwall and Oliver Evans (1755-1819) of Delaware from experimenting with steam under higher pressure. At the time they were both considering the application of steam power to improve transport.

Trevithick built a high-pressure winding engine in 1801 and Evans an engine for driving machinery to cut blocks of marble and grind plaster of Paris. In 1805 Evans fitted another such engine to an amphibious dredge. His engines in various forms aided the westward expansion in North America and in the development of riverboats. In the same year Trevithick combined, in the one machine similar to that used in early locomotives, a high-pressure boiler and engine with vertical cylinder.

George Henry Corliss (1817-88), born on Rhode Island, pioneered the use of special valves that allowed very precise control of the running speed, making these engines particularly suitable for mill use. They were exported all over the world and in Europe were favoured for electric light and tramway power installations. The first to work in Britain was at an Aberdeen paper works where it was known as "The Yankee".

In the 19th century these engines applied in different fields made industrialisation possible on a vast scale, and while their use had its darker side, the engines themselves stand out as landmarks in the technological use of steam. They were variously applied in large and small industrial installations, riverboats and steamships, railways, road vehicles, and agricultural engines.

Boilers

As engines developed so did boiler design. Those used by Savery and Newcomen around the 1700s were adapted from ones used by the breweries of the day. Of beaten copper with a lead top and soldered joints they stood on bricks over their furnaces. They were unreliable and inefficient. Later they were of all copper construction and then of cast-iron with wrought-iron plates over the fire. Initially made to any convenient shape to suit the manufacturer the designs seem rather quaint today.

In the pre-Watt era they were of a haystack shape with the fire underneath, and around the 1800s Watt introduced a wagon shaped boiler with the fire at one end. Stephenson, constantly seeking improvements, jacketed his boilers with narrow strips of wood and increased the size and efficiency of the fire tubes. Captain Randell, River Murray paddleboat pioneer and builder of the PS Mary Ann, used a box-shaped boiler in 1853 with a round firebox running through the lower part of the boiler to a flue. Under steam the sides of the boiler were said to bulge alarmingly, and a chain with wooden wedges were used to control the bulging! Even so at speed the boiler sides were reported to swell in and out like a concertina.

Not surprisingly explosions and failures were common, but these boilers were generally acceptable until the 1830s when designs better able to stand higher pressures without exploding (so frequently!) were introduced.

Cylindrical boilers made of iron instead of copper and with hemispherical ends proved stronger and lasted longer. The development by Trevithick of the Cornish boiler with a large flue, or fire tube, that took the heat right through the length of the boiler was followed by the Lancashire boiler with two such flues.

This design remained in general use until the early 1900s when water-tube boilers, patented by Babcock and Wilcox in 1867, came into favour. In these the heat from the furnace acted directly on the water in tubes passing through the fire. Steam could be raised quicker and more efficiently and they were widely adopted in large marine and power station installations. However the water-tube boiler found other uses. In 1930 a steam car using a water-tube boiler could raise steam in thirty seconds.

Steam generated rapidly by another method, virtually instantaneously, is known as Flash Steam. In this technique water under pressure is directed against a heated surface and instantly converted to steam. This is typically the inside surface of a tube or series of tubes, heated externally by an oil, petrol or gas flame. The tube is usually coiled and housed in a stainless steel case with the flame being directed through the centre of the coil. By regulating the heat the steam can be generated and superheated in the one device. In a simple form a flash steam boiler propels toy "pop-pop" boats.

In 1850 an attempt was made to superheat steam when Jules Petit fitted a cylindrical steam dryer to some French locomotives to improve their efficiency. By 1910 the use of superheated steam became widespread, as the efficiency of engines could be increased by up to 25%. The saturated (or wet) steam from the boiler passed through a series of tubes in the flue where the waste heat converted the moisture into more steam and raised its temperature, thus enabling it to do more useful work.

Traction engines, built in England for use where other fuels were not readily obtainable, were often fired with straw. Where timber was plentiful along riverbanks paddle steamers were generally fired with wood. Depending on cost and availability boilers were designed to run on a variety of fuels. Coal, creosote, oil, and more recently heat generated by nuclear reaction and natural gas, have all been used to produce steam.

To be continued ...

A Load and Lift Trolley

Story and photos by Mike Munns

Introduction

When I first started to build my 3" scale model traction engine (too many years ago!) I didn't give much thought to the fact that its all up finished weight would be around 600kg. But I soon became focused on the weight and associated lifting problems when I made the boiler. Using 4mm copper sheet instead of 3 mm, as then recommended by the AMBSC, put the boiler weight up to around 30kg. By the time the main components for the engine were well advanced, so was I — well past my allotted 3 score and ten years. I could see that for a safe and comfortable working height — for assembly before and after painting, as well as for testing, adjustments and maintenance I would need to be able to lift the model on to a work table from ground level. If and when completed it would also be necessary to load the engine on to and from a road trailer.

My workshop is not well suited to heavy overhead lifting and in any event a traction engine does not have a very convenient lifting shape or weight distribution. Eventually my thoughts turned to solving the lifting and loading problem before going any further with the model. This of course is usually the case with our fascinating hobby — each new problem during manufacture provides an interesting distraction from the main objective. No wonder it takes so long from start to finish of the complete model.

Lifting a hot 30kg copper boiler into and out of the pickling bath 20 or so times is a distraction in itself. So is the problem of closing hundreds of $^3/_{16}$ inch diameter steel rivets for the wheels and hornplates. These sidetracking tasks involved making special lifting and hydraulic riveting equipment which took up much indirect but interesting time before getting on with the main objective of making progress with the model.

About that time I noticed an advertisement in the *Model Engineer* magazine for an hydraulic workbench, originally developed for motor cycle maintenance and made by Handy Height of Loddon, Norfolk, UK. Since it was also being used for model locomotives and was offered for use with traction engines I tried unsuccessfully to buy a set of drawings which I could adapt to suit my own needs. The cost of importing even an unpainted unit without customs duty and sales tax was higher than I was prepared to pay but what really decided me to make my own was that the UK workbench had a minimum table height of 250mm so I would still be faced with the problem of transferring the model from the floor to the lowered level of the trolley and vice versa.

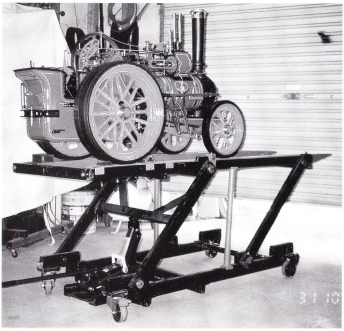


Photo 1 — Trolley fully elevated

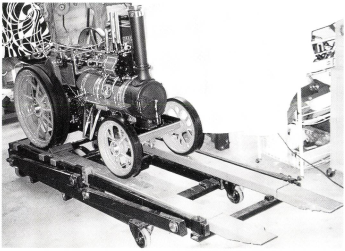


Photo 2 — Trolley lowered

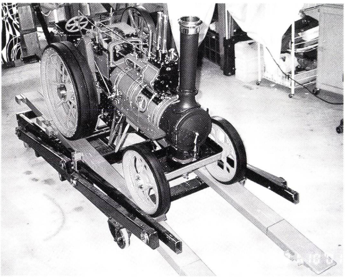


Photo 3 — Track rails on floor

More recently the *Model Engineer* has carried an advertisement by Power Controllers Ltd of Manchester who also offer a range of hydraulic powered lifting tables, with capacities up to 1000kg, but they all have an above ground starting point with minimum lift heights of at least 270mm.

Design objectives

(Note: the drawings in this article are intended as a guide only as each individual will need to dimension to suit his own needs ... Ed.)

The starting point for my trolley design was to provide a work table height approx. 750mm above ground and to be able lower the work table and the finished model weighing 600/700kgs to a level from which it could be safely moved to the floor of the workshop. The work table should be capable of being moved on castors to allow loading and unloading on to or off a box trailer backed into the workshop which has a roller door.

The main feature which needed to be added to the advertised UK work tables was the facility to self-load the traction engine on and off the work table making it independent of an over head hoist or separate lifting equipment.

Before the sketching phase there was a long series of ideas

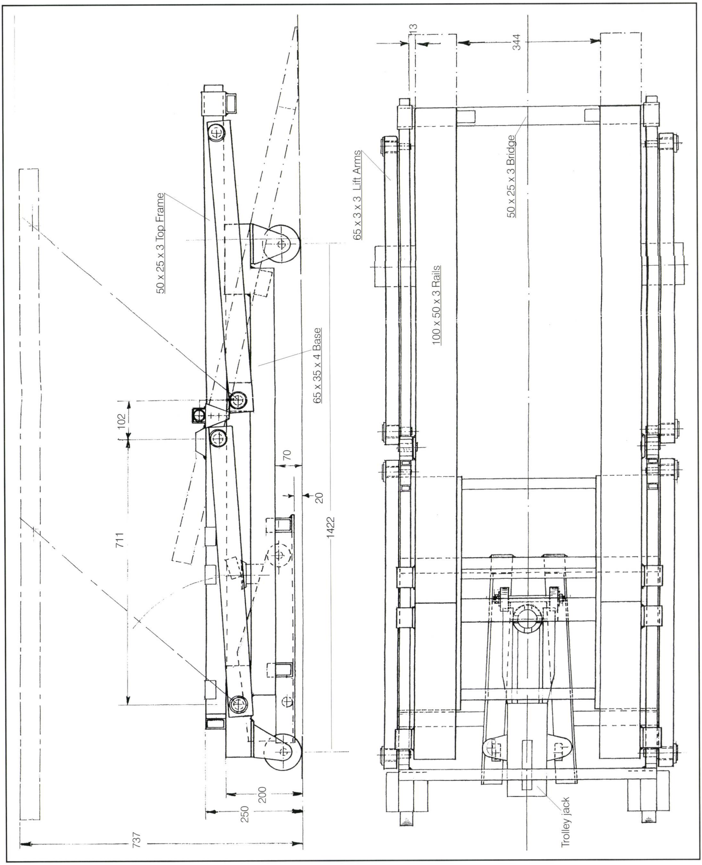


Figure 1 — General arrangement

turned over during the wee small hours — mostly based on possibilities of using linked screw jacks or worm and wheel lifting drive systems. They were all rejected as being too complicated and expensive for what after all was only required to be a workshop accessory. Eventually it became obvious that for simplicity the hydraulic lifting method used by both Handy Height and Power Controllers of UK was ideal, provided their operating principle could be further developed to allow the model to be transferred from their minimum lowered height to the floor. The restriction imposed by these available systems is due to the lifting mechanism being integral with the worktable — or the rails on the locomotive version. So the lowest level to which the model may be taken is fixed by the lowered height of the hydraulic trolley jack underneath the worktable.

The hydraulic lifting trolley jack which the UK worktables use is widely and cheaply available here. It is one of a range of hydrau-

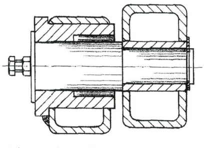


Figure 2 — Bottom bearing

lic jacks and trolleys with different lifting capacities used for vehicle servicing both commercially and privately. They are readily available from automotive parts supply retail outlets in every sizable town. And being ex-Taiwan they are cheap and good value for money. In fact I already had one for garage use.

The other consideration which the UK equipment suggested was the choice of either a work table lifted by a scissor mechanism or one using parallel lifting arms. Because I didn't want to get involved in the sliding or rolling bearings and guides required for the scissor lifting method I decided to opt for the parallel arms — even though that tends to make for a longer machine.

A traction engine trolley

Figure 1 shows the layout of the design which finally emerged from the pros and cons of my own requirements. This is not a general solution to the basic need which we all face with a heavy model because the capacity and dimensions of the trolley have been aimed specifically to suit my model. However, the principal features may be applied to enable similar trolleys to be made to suit other wheeled models such as locomotives and traction engines.

At this stage it is important to point out that in common with other lifting equipment safety awareness and precautions are essential. At every stage of its use, involving loading and unloading and especially lifting and lowering, care in preparation and operation is necessary.

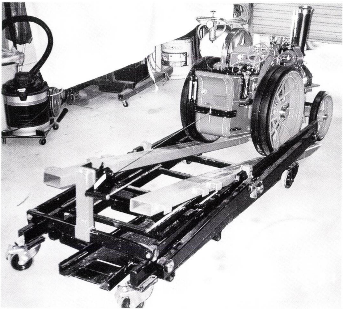


Photo 4 — Unloading the model

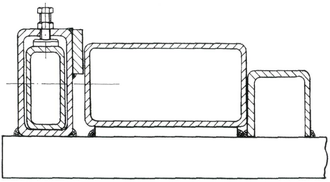


Figure 3 — Bridge end hanger

With that proviso of common sense the trolley may be safely used by one person.

The design of the trolley consists of three main elements, the base frame, the lifting arms, and the top frame. The base frame houses the lower bearing journal pins for the lifting arms and also carries the hydraulic trolley jack on its platform, which is located between the long side members of the base. Castor wheels are fitted at the base frame corners, swiveling and lockable at the rear and fixed at the front. Above these are support pads on which the top frame rests in its lowered position.

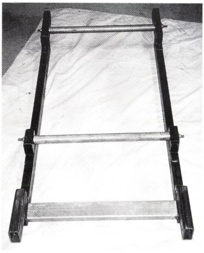


Photo 5 — Base frame weldment

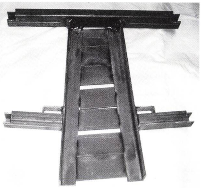


Photo 6 — Jack platform weldment

The two lifting arms at each side connect the base frame to the top frame, via top and bottom end bearings, thus forming a parallelogram or operating pantograph. The rear pair of lifting arms are rigidly joined by a braced cross member which is pushed up by the hydraulic jack pad so that as the two pairs of arms move together the top frame is lifted. This guarantees a level and horizontal lift of the top frame which support the two separate track rails which together make the work table. The top frame side members are joined at the rear by a fixed cross strut and at the front by a removable bridge. This front bridge supports that end of the two rails on which the model sits whilst it is being lifted to the required work height. This support bridge for the rails is really an extra safety precaution because whilst the model is being lifted to or at work table height and in the rear position on the track rails the centre of gravity of the model is behind the pivot bearings. So this position of the model along the track prevents the rails from tilting. The bridge is removed only after the the top frame has been fully lowered. This allows the track rails to

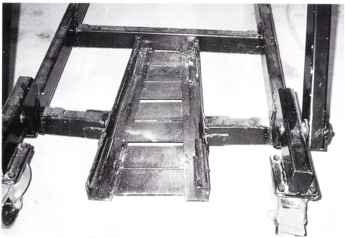


Photo 7 — Base frame-jack platform

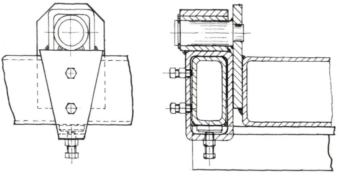


Figure 4 — Rail pivot

be tilted forward until the front shoes reach the floor. In this position the underside of these rails are also supported by pads fixed to a front cross-beam on the base frame. The tilting of the track rails is arranged by fitting pivot pins on the rail sides and corresponding bearing housings on the top frame. These housings are adjustable along the top rails to find the precise fulcrum point to coincide with the designed tilt angle.

The general arrangement drawing, **Figure 1**, shows a side elevation and below it an overhead plan view of the trolley (with my apologies for using an out dated drawing projection). The assembly is shown in the lowered position, highlighting the important minimum dimension — which is the under clearance of 20mm. This small under clearance is acceptable for the flat even concrete floor in my workshop but obviously less suited to use over gradients. This under clearance is important because it establishes the lowest height from the floor of the lifting pad on the hydraulic jack, which in turn determines the lowest position of the movable top frame. All this helps to obtain the lowest angle of inclination of the rails to the floor for unloading the model from the trolley. This is shown chain dotted in **Figure1**, with the removable track shoes in contact with the floor and the separate rear section of the track rails not attached to the tilted section. Whether this two-piece track feature is useful or necessary is a matter of opinion.

The hydraulic trolley jack has a safe working load of 1700kg with lowered height of 135mm and raised height of 385mm.

Operating features

Photo 1 of the trolley in the elevated position shows the safety supports placed between the top and bottom frames in the work bench mode; when the hydraulic trolley jack may be removed. Wheel blocks are used to prevent movement of the model along the track.

Photo 2 shows the trolley in its lowered position for unloading the model before the top frame bridge has been removed to allow the tracks to be tilted downwards. The top frame bridge, detailed in **Figure 3**, is clearly seen beneath the front ends of the rectangular tracks. **Photo 3** shows the trolley in its lowered position for unloading after the top frame bridge has been removed with the tracks tilted on the rail pivot pins detailed in **Figure 4**.

Photo 4 shows the unloading almost completed. By using a small boat winch mounted on the top frame rear cross member, with a wire cable attached to the rear of the traction engine, the model can be safely rolled along the tracks. The traction engine steering gear is used, if necessary, to keep the front wheels within the track rails. As the weight of the model is transferred over the fulcrum point of the rail pivots the track rails tilt downwards allowing the model to be rolled to the floor and the winch cable to be disconnected. Loading is a reversal of this procedure — either with a little help from your very best long suffering mate, or perhaps under steam! It would not be beyond imagination to add an electric powered winch.

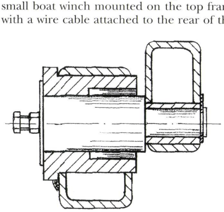


Figure 5 — Top bearing

Clearly, transferring the model to a box trailer is more straightforward. Still to be decided is the method of removing the model at a destination from the trailer without the trolley. This may be done by removing the track rails from the trolley and using them on the tail of the trailer with the winch to lower or raise the model between the trailer and the ground. This will probably require the track rails to be modified, to be lengthened and side guides added.

Alternatively a tilting trailer may be preferred — or even a loading dock at destination!

Construction features

It is not intended to describe every step in the construction and in any event the design dimensions and the part details are specifically suited to my 3 inch scale traction engine — and probably most other 3 inch scale traction engines. However there are some key features which may be of general interest. Firstly, the materials used for the structural items are rectangular hollow rolled steel sections of three different sizes, the heaviest being 65 x 35 x 4mm for the base frame. The parallel lifting arms are of 65 x 35 x 3mm and the top frame is mainly 50 x 25 x 3mm steel section. The track rails are 100 x 50 x 3mm, a size chosen for the width necessary to accommodate the front and rear wheel tracks of the model. Some of the steel section was bought at a knock down price because the stockist had ordered the wrong size for an end user project.

Base frame

Photo 5 is the preliminary weldment for the base frame with its temporary spacers and rail support cross member — before welding the trolley jack platform shown in **Photo 6**. The final assembled welding of these two components is shown in **Photo 7**. The preliminary weldment Photo 5 shows short pieces of the same RHS material welded at the ends and at an intermediate position, to provide three supporting pads for the top frame when it is lowered. The temporary tube spacers are fitted at the bottom bearing locations for the lifting pins. The spacers serve to keep the two base members parallel whilst welding the trolley jack platform Photo 6. At that stage predrilled plates 100 x 100 x 6mm thick are welded under the base frame at each corner to suit the flange mounting 100mm dia castors. A detail of the bottom bearing is shown in **Figure 2**.

Jack platform

This is shown 'in situ' within the base frame in Photo 7 and is perhaps the most important component of the design. Together with the lift strut, which is welded to the rear pair of lifting arms, the jack platform is subject to the highest forces involved in the operation of the trolley. To ensure that the working stresses are kept to a safe minimum a rigid and robust structure is essential. This is achieved by using heavy gauge materials as well as good and generous welding. The platform floor is made up of two inclined tracks of 50 x 50 x 6mm rolled steel angle section, to provide a trolley wheel guide. These angle tracks are joined by a series of transverse floor plates of 50 x 6mm section. The length and final assembly position of the platform must be carefully calculated and checked because when the top frame is in its lowered position and resting on the support pads on the bottom frame the lift pad on the hydraulic trolley jack must be centred on the underside corner of the lift strut. Then as the jack lifts the parallel arms the lift strut describes an arc about the centre of the rear bottom bearing. So the lift contact area between the jack and the strut moves backwards and the trolley jack must be free to roll back as required. But the relative position of the jack lift point and its wheels also changes as the jack lift height increases. The trolley wheels move forward in relation to the jack pad causing a net movement of the wheels on the jack platform which is the result of these two separate movement relationships.

Sufficient space must be allowed between the jack front wheels

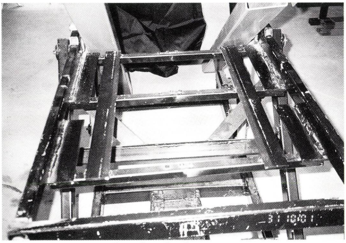


Photo 8 — Top frame - rear

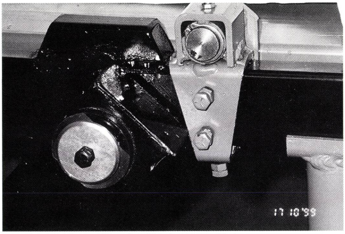


Photo 9 —Top frame - rail pivot

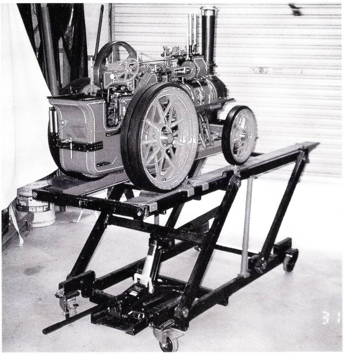


Photo 10 — a last look at the 3" Fowler on the trolley

and the forward cross hanger of the jack platform so that the trolley jack is not restrained from its self-adjusting movement along the platform floor whilst lifting.

These working clearances need to be taken into account when cutting the platform floor parts and working out the location of platform side hangers which are subsequently welded to the bottom frame. These front and rear side members use the same heavy gauge RHS steel as the bottom frame. They are carefully cut to provide a rebate to fit inside and under the bottom frame and they are also reinforced with angle or RHS pieces at the weld junctions in order to add to structural and weld strength at the platform floor joints and especially where the platform side hangers are welded to the base frame as shown in **Photo 7**.

Lifting arms

The four identical arms were bored at each end using an HSS serrated hole cutter on the vertical mill. It will be noticed from the side elevation in Figure 1 that the bearing positions are off centre to the long axes of both the lifting arms and the top frame. By lifting the centres on the arms and lowering them on the top frame it allows for optimum location and cross sectional strength for the cross strut, which is welded and braced between the rear pair of arms, and with which the lift jack engages. To obtain the necessary accuracy for these bearing centres a simple plate jig was used when drilling the pilot hole for the cutter. Flanged bearing housings were turned to suit the 45mm holes in the lifting arms and bored for the 25mm bearing journals and needle roller bearings. See **Figures 2 and 5**.

Needle roller bearings were used to minimise the stick-slip risks of uneven lifting of the arms which seems to have ocurred on some of the UK work tables. The bearing housing flanges were tack welded to the outside of the arms after a trial assembly of the complete trolley.

Top frame

This comprises the two side members joined at the rear with a welded cross bar of the same 50 x 25 x 3mm steel section. The top frame is lifted horizontally by the four side arms operating in parallel. A short 25 x 25 x 3mm reinforcement is welded above the rear lift pins in order to reduce the maximum bending stress which occurs at this point in the top frame. The frame carries the independent track rails on which the model sits. These two rails rest on flat plates which are welded to the underside of the top frame sides and which extend from the rear almost to the rail pivots, see **Photo 8**. Cross tubes of 25 x 25 x 3mm are also welded beneath the rail support plates extending from the outside edge of the frames to the centre line of the frame assembly at which junction they are connected with square section steel bars fitted inside the cross tubes and fixed by securing screws. This arrangement makes it possible to dismantle the complete trolley into separate parts capable of being manually handled and lifted on to the box trailer — if and when required!!

Carrying track rails

The pair of rails which support the model are positively located by welded side lugs made of half pieces of the same larger size of 65 x 35 x 4mm RHS which is used for the base frame. These lugs drop over the frame top sides when the rails are horizontal but disengage when the rails are tilted to load or unload the model off or on to the floor. The rail pivot detail is shown on **Figure 4** and in **Photo 9** and here again it is made up of pieces cut from the top and bottom frame RHS materials. A small 6mm plate welded to the side of the rail carries a welded 20mm pivot pin which runs in a short piece of galvanised water pipe bored to suit. The pivot bearing can be adjusted and secured along the top frame to achieve the best support under the tilted rails which is provided by the cross member at the front of the base frame. Although the track rails are of two-piece construction with the objective of improving location and support this is probably not required. However the separation of the rail extension shoes to provide floor contact is useful if only because it shortens the overall length of the trolley.

Bearing details

These are shown in Figures 2 and 5 — the bearing journals and lifting pins are fitted in steel bushes fixed with Loctite® in top and bottom frames and secured endwise with circlips. The bearing journals and pins are made from some scrap hydraulic piston rods of which I had ample supplies and which I knew to be the old EN8 specification. This is much better than mild steel for this application and in fact the same scrap was used and hardened for the crank pin on the traction engine. The pins in the bottom frame are 20mm and 12.5mm in the top frame. Even if I had used the lower strength mild steel for the 12.5mm top frame lifting pins the maximum shear stress would have a safety factor of more than seven, assuming the total traction engine load being taken on one pin. So using the EN8 material which is about twice the ultimate strength of mild steel is a luxury I was well able to afford as the EN8 cost me nothing! The journals and pins were lightly smeared with molygrease on assembly which should be sufficient for the normal occasional use.

Operational comments

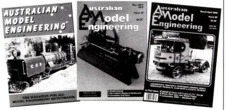
One of my main concerns was whether the trolley jack would be safe and easy to operate by one person, especially bearing in mind the need for safety in lifting and lowering the substantial weight involved. In practice it has been surprisingly easy — even lowering from maximum height the 600kg + weight can be smoothly and safely controlled during descent by a slow turn of the hydraulic release valve on the jack. The lowering speed can easily be reduced or stopped during descent so as to obtain a cushioned lowered position.

It was originally intended to transfer the hydraulic trolley jack from its lifting platform at the rear and use it to lift the front of the track rails in order to ease the load on the front bridge whilst removing it to allow the rails to tilt forward. This has not been necessary and the bridge can be taken off and put back on by hand once the locating screws have been released. At worst a little persuasion with a nylon faced mallet would be sufficient given care is taken during manufacture to ensure that the intended working clearances are obtained.

So far I am satisfied with the design and operation of the load and lift trolley although it has to be said that it has only had a few ups and downs!

Some may feel that the jack pad ought to be firmly fixed to the lift strut but in operation the strut rolls on the pad and it is only necessary to ensure that the jack pad is in the correct position before starting to lift which of course is the normal precaution for such lifting gear! On reflection my only criticism has been with its manufacture. If I had to repeat the exercise, which of course I never will, I would take more time and precautions to minimise distortion when welding the rail support plates to the underside of the top frame. I probably erred on the side of excessive welding as "belt and braces" has always been my weakness! We always seem to find the best way to make something after we have finished it and I suppose that is what separates us amateur model engineers from the professional craftsmen! But this has been a very worthwhile distraction from the traction engine and I must now give some thought to a belt driven saw bench so as to give the engine some work.

Australian Model Engineering Back Issues



#1	***October***	***1987***	***$8.00****
#2	***November***	***1987***	***$8.00****
#3	***December***	***1987***	***$8.00****
#4	***January***	***1988***	***$8.00****
#5	***February***	***1988***	***$8.00****
#6	***March***	***1988***	***$8.00****
#7	***April***	***1988***	***$8.00****
#8	***May***	***1988***	***$8.00****
#9	***June***	***1988***	***$8.00****
#10	***July***	***1988***	***$8.00****
#11	***August***	***1988***	***$8.00****
#12	***September***	***1988***	***$8.00****
#13	***October***	***1988***	***$8.00****
#14	November	1988	$5.00
#15	***December***	***1988***	***$8.00****
#16	***January***	***1989***	***$8.00****
#17	***February***	***1989***	***$8.00****
#18	March	1989	$5.00
#19	***April***	***1989***	***$8.00****
#20	***May***	***1989***	***$8.00****
#21	June	1989	$5.00
#22	***July***	***1989***	***$8.00****
#23	***August***	***1989***	***$8.00****
#24	***September***	***1989***	***$8.00****
#25	***October***	***1989***	***$8.00****
#26	November	1989	$5.00
#27	December	1989	$5.00
#28	January	1990	$5.00
#29	***February***	***1990***	***$8.00****
#30	March	1990	$5.00
#31	April	1990	$5.00
#32	May	1990	$5.00
#33	***June***	***1990***	***$8.00****
#34	***July***	***1990***	***$8.00****
#35	***August***	***1990***	***$8.00****
#36	May-June	1991	$6.50
#37	July-August	1991	$6.50
#38	Sept-Oct	1991	$6.50
#39	Nov-Dec	1991	$6.50
#40	***Jan-Feb***	***1991***	***$8.00****
#41	March-April	1992	$6.50
#42	May-June	1992	$6.50
#43	July-August	1992	$6.50
#44	Sept-Oct	1992	$6.50
#45	Nov-Dec	1992	$6.50
#46	Jan-Feb	1993	$6.50
#47	March-April	1993	$6.50
#48	May-June	1993	$6.50
#49	July-August	1993	$6.50
#50	Sept-Oct	1993	$6.50
#51	Nov-Dec	1993	$6.50
#52	Jan-Feb	1994	$6.50
#53	March-April	1994	$6.50
#54	May-June	1994	$6.50
#55	July-August	1994	$6.50
#56	Sept-Oct	1994	$6.50
#57	Nov-Dec	1994	$6.50
#58	Jan-Feb	1995	$6.50
#59	March-April	1995	$6.50
#60	May-June	1995	$6.50
#61	July-August	1995	$6.50
#62	Sept-Oct	1995	$6.50
#63	Nov-Dec	1995	$6.50
#64	Jan-Feb	1996	$7.50
#65	March-April	1996	$7.50
#66	May-June	1996	$7.50
#67	July-August	1996	$7.50
#68	Sept-Oct	1996	$7.50
#69	Nov-Dec	1996	$7.50
#70	Jan-Feb	1997	$7.50
#71	March-April	1997	$7.50
#72	May-June	1997	$7.50
#73	July-August	1997	$7.50
#74	Sept-Oct	1997	$7.50
#75	Nov-Dec	1997	$7.50
#76	Jan-Feb	1998	$7.50
#77	March-April	1998	$7.50
#78	May-June	1998	$7.50
#79	July-August	1998	$7.50
#80	Sept-Oct	1998	$7.50
#81	Nov-Dec	1998	$7.50
#82	Jan-Feb	1999	$7.50
#83	March-April	1999	$7.50
#84	May-June	1999	$7.50
#85	July-August	1999	$7.50
#86	Sept-Oct	1999	$7.50
#87	Nov-Dec	1999	$7.50
#88	Jan-Feb	2000	$7.50
#89	March-April	2000	$7.50
#90	May-June	2000	$7.50
#91	July-August	2000	$7.50
#92	Sept-Oct	2000	$7.50
#93	Nov-Dec	2000	$7.50
#94	Jan-Feb	2001	$7.50
#95	March-April	2001	$7.50
#96	May-June	2001	$7.50
#97	July-August	2001	$7.50
#98	Sept-Oct	2001	$7.50
#99	Nov-Dec	2001	$7.50
#100	Jan-Feb	2002	$7.90
#101	March-April	2002	$7.90
#102	May-June	2002	$7.90
#103	July-August	2002	$7.90
#104	Sept-Oct	2002	$7.90
#105	Nov- Dec	2002	$7.90
#106	Jan-Feb	2003	$7.90
#107	March-April	2003	$7.90

**** These issues are A4 sized reprints***

AME Retail
PO Box 1403
TUGGERANONG, ACT 2901
Ph/Fax: (02) 6292 1938

(If phone is unattended please leave a message and we'll get back to you)

Email: **jpoliver@webone.com.au**

Prices include GST and Postage in Australia

New Zealand: *Add A$2.00 per issue*

Other Countries: *Add A$3.50 per issue*

Note: *With larger orders we pass the reduced rate of postage per magazine on to you.*

Club Roundup

with Gerardus

Ballarat, Vic

The BSME are still in existence and we are fast approaching our 20th Birthday. We were fortunate to be recently given a good size lease of land at the Invermay Progress Association Sports Ground that will allow us to build two multi-gauge ground level running tracks. The plan is for two separate tracks, one 3.5"/5" gauge for the smaller locomotives and a second one of 5"/7.25" for the larger locos and for passenger hauling. The Invermay complex has many facilities for visitors and guests, such as picnic/B-B-Q areas, toilet facilities, and club facilities (yes, they even have a bar for those hot days) and they cater for cricket, bowling and horse club facilities as well.

Track preparation and laying has commenced and it is anticipated that we should have trains running on the larger track by mid 2004 if all goes to plan and the smaller track not long after. Future plans are for a Traction Engine track and boating pond.

The Invermay site is on the northern side of Ballarat on Swindlers Road. Turn off the Western Freeway at the Ballarat/Creswick exit then turn left at the first roundabout onto Hienz Lane. Keep going straight up Heinz Lane, across the roundabout, back under the Western Freeway and continue on to Swindlers Road. The Grounds are on the right side approximately 1.5 kilometres after passing under the Freeway bridge. We will keep all informed on our progress and new members or visitors are always welcomed.

Ballarat Society of Model Engineers.
Location: *Invermay Sports Complex, cnr Muscatel St and Swindlers Rd, Invermay*
Public Running: *None yet*

Balcatta, WA

Seventeen members and three visitors attended the January meeting which comprised of several members discussing their latest projects, problems and a lot of group discussions. From the comments made, those who attended thought it was an excellent night. It has been agreed by the committee that around half the future meetings will be informal. We have been advised that our insurance will rise again by about 25%. This year is our 10th Anniversary of the track openning so any ideas for the celebration can be submitted to the Secretary. Stuart Martyn has built an impressive range of models including a Wallis & Steevens 6 inch scale traction engine which has proved a popular alternative attraction to train rides.

Northern Districts Model Eng. Society
Location: *Vasto Place, Balcatta*
Public Running: *Last Sunday*
www4.tpg.com.au/users/jimclark

Blenheim, NZ

The Heritage Day started out OK but it wasn't long before drizzle set in and stayed around for most of the day. Despite the weather we were kept busy until mid afternoon, when after the parade most people that were on site drifted away. The ground level track was kept busy with Maurice and Mat sharing the driving of *Southern Belle.* Running on the raised track were Rex with his *Sweet Pea,* Tom with the D^F and Ron with *Blythe Spirit.* It was also nice to see the pond being put to good use on club days — a flotilla of yachts can be seen on most Sundays. It is also good to see our aero modellers putting on displays during these club events as these nice looking aircraft attract a lot of public interest.

Marlborough Associated Modellers Society
Location: *Brayshaw Park, Blenheim*
Public Running: *1st Sunday*

Burnaby, BC, Canada

The Society is celebrating its 75th anniversary as a society and its 10th anniversary at Confederation Park. We have a membership of 160 and a magnificent site with station, carriage shed and workshop. There is currently 14,000 feet of 7.5" ground level track and a raised track is under construction. Approval and permits have finally been obtained for the passenger waiting area. Construction has started on the foundations and this canopy will cover both the passenger waiting area and the first station track. The Frost Bite Meet was a great success but not because of frost, snow or rain. Again, it was very mild for January; in fact it was hardly winter as we know it, but we'll take it even if we didn't get a chance to push snow with our club's Sutcliffe CPR plough.

British Columbia Soc. of Model Engineers
Location: *Rainbow Creek Station, 120 Nth Willingdon Ave, Burnaby, BC.*
Public Running: *Saturday, Sunday & public holidays, Easter to Thanksgiving*

Casino, NSW

Our club is running full steam ahead with passenger numbers up on a very high level over the summer months. The revenue running days have succeeded in keeping the overhead bills paid, even though most of them have escalated by as much as 300% over the past 12 months. The few extra dollars to come in have been eaten up in early preparations for the Old Casino Station centenary and our society's birthday celebrations being organized for this coming October. As always in these situations, many things seem to take forever to show progress, but at the end of the day (with all fingers crossed) all will fall into place. The place is a hive of activity as all are working "fingers to the bone" so to speak to have everything just right for the big occasion. The club's three locos are all undergoing maintenance work to have them ready in time, as is all the rolling stock.

Figures for the past 3 years clearly demonstrate that the value of advertising far outweighs the cost. It was agreed to extend the advertising in the future to include more and better venues such as plastic signs for the community notice boards at the various main road entrances to the town.

A mid-year report from the track and structural engineer advised that several sections of track would be in need of attention over the next few months. As a whole all structural items such as fences, bridges, stations, level crossing and gates, etc. were in good order although the whole track layout is in need of re-ballasting.

Pacific Coast Railway Society Inc
Location: *cnr. Queensland Rd and West Street, Casino*
Public Running: *every Sunday*
www.casinominirail.com/

Christchurch, NZ

At the Exhibition weekend, there were a total of 76 models on display — the best effort for some time. Members were invited to Ashburton where the restored K88 was on display. K88 is a three foot six inch gauge ex-New Zealand Railways 2-4-2 bogie tender main line steam locomotive at the Plains Railway, Ashburton. It was a one of a batch of 8 locomotives built by Rogers of the USA that initiated the first Christchurch to Dunedin rail link. The weather was kind and 45 CSMEE members and their families attended.

On the model locomotive front, the D^F loco now has a new motor (the old one was 40 years old) and is back in service whilst new batteries have been installed into Wayne Lester's electric loco. The Club's galvanised stanchions for the steaming bays have arrived as has the Australian copper boiler code. Plans for the engine shed on the new site were approved by members.

Canterbury Soc of Model & Experimental Engineers
Location: *26 Andrews Cres, Christchurch*
Public Running: *1st & 3rd Sundays*
www.csmee.org.nz

Durban, RSA

At the club meeting near the end of last year was a "Bits and Pieces" session where members brought along their goodies. Bob Summers had managed to get hold of a 52 year old Boxford lathe that had never been used. The tail stock was missing and Bob brought along to the meeting a replacement that he had made. Theo Gooden brought along a surface gauge and a 4 oz hammer he had made for clock making. David Meiring passed around parts of an injector for members to examine. Steve Stephens displayed and discussed the manufacture of a sundial. Dave Rose demonstrated a tool centre gauge which sits on the cross slide of his lathe. This enables him to set the tool to exactly the correct centre height. Jimmy Ingram showed members the forward,/reverse mechanism, connecting rod parts, cylinder head templates, pistons and slide valves for the *Simplex* that he is constructing. Ted Smith gave a very interesting talk on a linisher he had made. Geoff Wilkinson demonstrated a locomotive boiler he started making 40 years ago. The full size version of Geoff's locomotive was made in 1895 and originally stood on the platform in Pretoria but is now in Johannesburg.

Durban Society of Model Engineers
Location: *Kellaway Hall, 10 Hinton Grove, Virginia*
Public Running: *2nd Sunday*

Gosford, NSW

During December, the long awaited digging out of the drain that runs behind the 7.25" steaming bays, took place. This involved digging a trench to the correct level to get the continuity in the fall of the existing drain. Positioning of the pre-cast drain slabs was done using a 4-wheel drive excavator which was also employed for most of the digging work. Whilst we had the machine at the club, we used it to our advantage and moved the coal bin from the centre lawn area near the station to a new position near the van. We also used it to excavate the ground around the 7.25" steaming bays to allow for the concreting of the area; something that will save many man hours of back-breaking shovel work. This project is almost complete but there is still some work to be done. The January running day is traditionally a quiet day and this one was no exception: Nobody was waiting too long for a ride as there were 19 locomotives running on the day. These included three visiting locos and whilst not all of them hauled passengers, it was pleasing to see so many locos at a running day. Work is continuing on the track, this time to the points at the south end of the station. This involved a considerable amount of cutting, grinding and welding as well as the installation of throw-over point levers to simplify the operation of the points in this area.

The February running day was a quiet day passenger-wise, thankfully because a lot of the steam locomotives were late raising steam due to the unexpected arrival at about 9:30am, of 0.4 m of concrete. This was used to finish off the foundations and around the drain for the access bridge and to continue the concreting of the 7.25" steaming bays. Thanks to all those members who helped out to quickly get the concrete laid and then get back to the running day. It was pleasing to see so many locomotives at the running day.

Over the weekend of the 22nd and 23rd of February, a number of members took the opportunity to participate in the Lake Macquarie club's 50th Birthday Run at Edgeworth. Even with that wondrous wet stuff falling from the heavens, everyone still had a good weekend.

Central Coast Steam Model Co-op Ltd
Location: *Lot 10 Showground Rd, Narara*
Public Running: *1st Saturday*

Hamilton, NZ

December: the end of the year and what a year it has been! The extra gauge has been added to the 5" track and is very popular both with the public and the drivers. The new bridge has been added and the bank retention finished. A complete new 3.5" and 5" gauge track has been installed for the smaller engines whilst new crossover points and lots of other points were installed. The area is being readied to install another hoist for the 3.5" and 5" gauge engines and the next upgrade will be the 7.25" gauge track. The open weekend went very well and Sunday running has been steady with some very busy periods. We also had a charity day for the SPCA and helped several schools with fundraising activities. We were also lucky in receiving several grants and sponsorship through the year.

Hamilton Model Engineers Inc
Location: *Minogue Park, Tui Avenue, Forest Lake*
Public Running: *Every Sunday*
http://communities.msn.com/HamiltonModelEngineers

Harare, Zimbabwe

The number of passengers on the running days in July to October picked up quite significantly compared with past months as we carried an average of 265 passengers, the highest number being 339 in September.

Efficiency trials were last held in 1990 and the Committee decided it was high time another meeting was arranged. This took place in November and although we were supposedly into the rainy season, it was a clear day. There were nine entries, the Society's *Speedy II* being driven by four members. There was one new entry, that being Nigel Launder's *Duplex*. Cyril entered his *Firefly* and achieved first place, Rodney Potter was second with *Speedy II* and Cyril Haden was third with the Garratt. Fourth place was taken by Graeme Nesham driving the late Dennis Hill's *King John*. Looking back at the results of the efficiency trials held since their inception in 1974, it is noted that this year is the first time *King John* was been entered. It is interesting to see that *Fireflys* have featured in the top three in all the eleven trials since 1975, the second occasion of this event.

Mashonaland Society of Model Engineers
Location: *Rainhill Park, Glenara Avenue North, Highlands, Harare*
Public Running: *3rd Sunday*

Invercargill, NZ

Our February meeting turned out to be a visit to David McKenzie's property at Wrights Bush to have a look at the traction engines stored and under repair there. Duncan Robbie organised this for us as it was a rare opportunity to see seven traction engines in the same place, and as two of them were under repair a good opportunity to see their inner workings. Of the seven engines there, one was having its boiler repaired, and another had the back wheels, axle, springs, differential and drive gears removed for overhaul and replacement of worn parts. These repairs all require some fairly heavy engineering which means access to large lathes, presses and fabrication equipment is required. Certainly not for the feint hearted. Duncan's traction engine and steam roller are stored there also while he ascertains what work is require to return them to steam again. Duncan and Gillian the hosted us for supper and our meeting once it became too dark to see any more traction engines.

Southland Soc. of Model Engieers Inc
Location: *Surrey Park, Invercargill*
Public Running: *None*

Knysna, RSA

For the benefit of readers who are not familiar with the KSME track, it has evolved over 20-plus years as an end-to-end double track laid across five separate properties on the beautifully wooded ridge overlooking Knysna lagoon. In the early years, most of the properties were owned by KSME members but this has changed over time. The last property to be sold, and only recently was that of Neels Ferreira, on which the station, steaming bays and storage facilities are located. In arranging the sale, Neels endeavoured to ensure the new owner would be sympathetic to the presence of our miniature railway; nevertheless, it was with some trepidation that the members awaited the first meeting with the new owner. This meeting with Pierre didn't go too badly. Essentially, he stated he had no problem with our operation continuing; however, as expected we would no longer have the use of the club room and toilet facility which is part of the main house. Understandably, he requested we continue to keep the site in good repair and not materially change our use of the facility. The story doesn't end there as at our last club evening, the Chairman reported that the property has been resold, yet again. Fortunately, the new owner does not appear to have any objections to our operation so it is business as usual, at least for the present.

On the project front, good progress has been made with the new steaming bay. A transverser still needs to be added to enable access to the steaming bay from the two loco sheds. Progress with loco projects has been good: Ron's Shay is looking magnificent, Elliot's Baldwin chassis has been tested on air whilst Brian is working on his new project, an American Baldwin 0-6-0 switching loco. Dennis is also well advanced with a switcher having completed the tender and now working on the chassis. Len and Gordon are making steady progress with their *Oompies* (British 5"gauge *Wren* 0-4-0 locos). Mike's Simplex has run at Plett under steam after repairs to the boiler. The 9F bought as a kit is a disappointment. Hopefully, 2003 will see progress towards eliminating the problem of the piston valves not sealing. The club continues to operate on a donation-only basis, however, donations do not appear to be inflation-linked !!!

Knysna Society of Model Engineers
Location: *42 Ridge Road, Paradise*
Public Running: *Unknown.*

Mangere, NZ

The Manukau Live Steamers Christmas party went off very well with about 50 members attending. We had a very busy day running trains prior to the party. The Classic American Car Club visited the MLS railway for the afternoon with their sparkling cars. During the Christmas and New Year break, Richard Morgan and his gang of helpers carried on with the much needed park track replacement program. During January, the gang continued and laid about 50 metres of new track out on the park.

David Giles organised a trip to Ashburton and invited live steam friends to come and share the day riding on K88. A little history on K88..... This 1878 Rogers-built loco ran for the NZR until 1924. Worn out and obsolete, the locomotive and tender, along with about 12 other locomotives, were dumped into the Oreti River, Southland, in 1925 to protect a railway embankment from erosion. Forty seven years later, in 1972, a group of live steam enthusiasts lead by Bob Anderson from Ashburton, found the wreckage of K88 and proceeded to exhume it from its muddy grave. The locomotive was a total wreck. The remains were taken by truck to the Plains Railway in Ashburton and over a period of ten years, piece by piece, the rusted and worn out hulk was stripped, cleaned, repaired and reassembled into a working locomotive. The boiler passed a safety inspection and was issued a ticket, but after five years it was condemned. Sadly, Bob Anderson passed away and the K88 project stalled for a while. In 1990, John French lead a team at the Plains Railway into a new era of fund raising. A new boiler was designed and ordered whilst much of the previous rebuild was redone with a lot of new components being cast and machined to bring the locomotive up to "A" grade mechanical condition. The original tender bogies and frame were finally located in the river in 1995. These have now been fully rebuilt and reunited with K88. The locomotive was steamed again in mid-2002 and is now in pristine condition in all respects.

Manukau Live Steamers Inc
Location: *Mangere Centre Park, Robertson Road, Mangere*
Public Running: *Every Sunday*
http://manukaulivesteamers.orcon.net.nz

Maryborough, Qld

Public Liability Insurance remains a hot subject and without it, many organisations have closed their doors. MELSA Maryborough Inc. found itself approaching a difficult situation this year when the proposed AALS premium could not be met. This left two options: either find another provider with suitable insurance who could offer a more competitive premium, or cease operations. Unfortunately, last May all insured societies were provided with incorrect and out-of-date information on Maryborough's insured status. The current insurance complies with the provisions of the Australian Insurance Contracts Act and is recognised as acceptable to Queensland Rail and the Qld transport regulator, Network Access, for running full-size steam.

Each year our association has combined with the Heritage Spring Festival for a weekend of activity in Queens Park with displays of members' work and presentation of awards. There were some 16 locomotives on hand, visitors bring engines from as far as Rockhampton and Brisbane. We were entertained by operation under radio control of Alan Houston's model of QR RM55 *Red Fred* railmotor – the detail Alan has added to *Red Fred* is most impressive! (*see article on page 48*)

Models on display included Bill Olds' exquisite model model of preserved QR DD17 class tank locomotive *Blue Baby* 1051, Des Rowland's A12 loco, a Hit and Miss petrol engine and a mill engine ticking over on air. Paul Jones offered a whole-stick cane wagon whilst Bob Kimber displayed the chassis of a 5" gauge NSW 'P' class on its erecting stand.

The Doug and Mary Kuskie Award and "Locomotion" Trophy for Completed Projects was won by George Punter's Cam Grinder (*see article on page 20*).

The Lynton McWatters Memorial Award for Projects in Progress was won by Trevor Dallman's guards van. The judges made a further Encouragement Award to Neil Thompson for his QR C17 loco.

Model Engineers & Live Steamers Assoc, Maryborough
Location: *Queens Park, Maryborough*
Public Running: *Last Sunday*

Melbourne, Vic

The February meeting started out with the presentation of trophies by the club president Robert to the deserving winners for the best model categories at the Christmas meeting. This followed with the main topic for the night, which was bench top machining. First off the mark was Gordon with his version of a digital read out made from the main part of an old ink jet printer. He had used most of the mechanics and the sensors from the printer, but had created his own electronics to make it work. Another member showed his apparatus designed for lapping lathe tools etc and maintaining correct cutting angles. John bought in his Britannica lathe that he'd bought at the club auction a year or so earlier (he outlasted me in that bidding contest for that nice little treasure). Stan displayed his sons beautiful bronze carburettor castings which he'd been preparing as replacements for some older type vehicles.

Please remember visitors are always welcome to the meetings, this could be a good opportunity for you to make new lifetime friendships with a common interest to boot.

Melbourne Society of Model & Experimental Engineers.
Location: *Meetings are held 2nd Friday of Month at 92 Wills St, Glen Iris 8.00pm start.*
Public running: *None.*

Moorabbin, Vic

We recently had a visit from our registered competent person who did his annual inspection and report on the state of our club's facilities. All was well except for a fence that needs to be tidied up and a gantry that requires major repair or removal. Given the volume of equipment inspected, this is a credit to the small but happy band of workers that regularly carry out maintenance around the grounds.

Maurie White donated to the club a Gurney water tube boiler (built 1985) coupled to a single cylinder mill engine, a vertical "steeple" engine and a twin cylinder marine engine with condenser. These models will be exhibited on public days. On the January run day, 25 people turned up to enjoy a sunny day with a cool breeze. Keith Hartly steamed his vertical boiler and ran two groups of stationary engines and pumps. Seven locos were run including new member Lindsay Hersey with his tram. Laurie Shank's "Mogul" had a steam test and then enjoyed a run. Another new member, Joe Dempsey had a delightful "Coffee Pot" (as found on the Pichi Richi Railway - not as in the kitchen!) Trial running of the first rebuilt ground level track bogies continues — the results with the strengthened springing appears to be satisfactory. The signals for the elevated track are being kept working and plans are afoot to replace the incandescent globes with clusters of high intensity LEDs.

Steam Locomotive Society of Victoria
Location: *128 Rowans Road, Moorabbin*
Public Running: *1st Sunday*
www.slsv.com.au

Mudgee, NSW

Last November's running day was fine, sunny and hot and on arrival at the track at about 8:30, we noticed a problem. Driving around to the canteen and crossing the track below the rail bridge, we saw on the concrete post beside the track a swam of bees. After phone calls, first to Honey Haven who gave the numbers of several beekeepers, we eventually found one who would come out and remove the bees. He arrived at about 10:15 am and quickly had them removed, allowing us to start running.

The December running day was warm and warmer! We ran in the up direction using the club locomotive while we had Ron Robards with his 5 inch 0-4-0 electric loco along with John Strahorn's 3.5" gauge gas-fired *Rob Roy* 0-6-0T loco. The Mudgee Air League, as well as selling hot dogs and sausage sandwiches, brought along a generator and a freezer to sell ice creams all day, and a lot of people, both young and old, partook of the treat during the day. At 3pm, we closed the gate to the public, and had a combined Christmas party. Quite a few members with their families and friends were present, while the Air League had a fair roll up of their own. Whilst we provided train rides to the kids, the Air League provided us with hot food and ice cream.

In December we erected a new sign, actually two signs set up to form a Vee, easily seen from both directions on the road. Each side of the sign is 1200mm square and displays our club name, days we run, phone no and address, as well as advising that the track is available for hire. January running day was again a warm day but luckily not a total fire ban.

This year's Blowfly Rally will be held on the 17th and 18th of May 2003. Again, the Saturday will be a private run and we will hold the shunting competition, slow running competition and a 'Go to Whoa' competition during the afternoon. Sunday will be a public running day and we have combined it with a birthday run so that everyone without a *Blowfly* can feel welcome to run what they want. Another reason for making it a Birthday run is because the club was formed in May 1986 and the track was opened in May 1992. Please come and make the weekend a success. You are more than welcome to camp on-site and provide on-site security for the visiting models.

Mudgee Miniature Railway
Location: *Cassilis Road, Mudgee*
Public Running: *2nd Sunday, Easter and Wine Festival*

Club Roundup

Most of the material which appears in Club Roundup is gleaned from **club newsletters**, although an increasing number of clubs are **emailing** or **faxing** us a report for this column.

If you don't already send us your club newsletter, how about giving it a go, or email or fax us with your club news. Try to keep it to topics which are interesting to others.

Post to : PO Box 21, Higgins ACT 2615
Fax to: (61 2) 6254 1641
Email to: amemag@bigpond.com

Perth, WA

With Castledare's 40th anniversary due this year, the club repeats its invitation to other AALS clubs to participate in the festivities. The big event will take place on the weekend of 11-12 October. The Saturday will be a general fun run day. The Sunday will be a public run with all proceeds going to the Princess Margaret Hospital for Children. Please contact club Secretary, Ken Belcher, if you would like more info. or to register your intention to attend.

There has been major progress on the upgraded 5" gauge shed since the last club round-up report. The main structure of the building is now complete and awaiting final fit-out. This represents a substantial extension to the club's main building complex. On the Fern Road junction realignment project, a retaining wall is under construction to separate the new "high level" line to Fern Road from the "low level" track out to the wetlands. Back at the main Niana Station, a new pedestrian crossing has been completed to improve passenger safety during loading and unloading of trains.

On recent run days, Castledare has entertained guests from a veteran car club with their vehicles, and a Scottish pipe band. The latter provided a march-past through the station by a piper and a pair of supporting drummers. The response ranged from a stirring of Celtic blood to a covering of non-Celtic ears.

There have also been some changes to the leadership of the club, with details to be provided in the next report, after the AGM. Our club can be contacted via the secretary, Ken Belcher, on (08) 9375 1223, email: skbelcher@wiredcity.com.au

Castledare Miniature Railways of WA Inc
Location: *Castledare Place, Wilson*
Public Running: *1st Sunday*
http://d1565.tripod.com/cmr/

Petone, NZ

The most recent attempt at holding a Christmas BBQ turned out very well. After our rained-out attempts of previous years, we had a very pleasant sunny evening that could not have been better. To the willing helpers who helped make the evening the success it was, a big thank you and also to Gavin for bringing and steaming his loco, then letting anyone that wanted a drive, to do so. Peter Anderson steamed up *Speedy* and again that was popular. It was especially good to welcome members of the Maidstone Club for the evening.

At the track, Brian Hawk tried out his fairly new D^{SG} 3005. Brian was concerned whether the chain drive to the inner axles of each bogie would allow enough side play for the bogie rotation on the curves of our radius. Gavin had No. 66 running but there were fewer people about than usual although we gave about 80 rides. It made for a pleasurable afternoon, however, without all the pressures of big crowds. Another good run was enjoyed on Jan 19 with 95 satisfied riders. Loco 2970 worked for part of the afternoon and Graeme Harris brought steam loco S216 down for a run and had raised steam by mid-afternoon.

Hutt Valley Model Engineering Society Inc
Location: *6 Marine Parade, Petone*
Public Running: *Every fine Sunday*
www.steammachine.com/hvmes

Port Orchard, WA, USA

At the annual meeting the club started what is expected to become an ongoing tradition of recognising one KLS member each year for outstanding contributions to the club and the live steam hobby. The inaugural award was presented to Ron Gates.

Meanwhile at the track, the yard is torn out and partly leveled. When completed it will be graded to ensure all runaways will roll to the middle. The ballast hopper has been moved and mounted on its new pad. When the yard is rebuilt there will be 9 switches (points) on the main track which will be double ended. Some spurs will be single ended and more may be added to increase storage if required.

Kitsap Live Steamers
Location: *South Kitsap Community Park, Port Orchard*
Public Running: *2nd & 4th Sunday, April - October*
www.kitsaplivesteamers.org

Salisbury, SA

Public open days resumed on Sunday, January 26 after recently introduced new Government legislation temporarily halted our public open days last August. At long last, the requisite but elusive certificate was finally received in the post box on January 15. Interim approval had been granted so that we were able to open for the Air International Christmas party on December 7. This was an outstanding success and the visitors are keen to hold their next Christmas party at our grounds. For private functions, we are able to offer better facilities at our own grounds and it saves a lot of work not having to cart the portable track around and set every thing up before running.

Stage Two loop — After many months of continuous hard work, Wednesday 26th Nov. saw the completion of 540 meters of 7.25" gauge track that comprises stage two of the redevelopment. The addition of the third rail for 5 inch gauge was completed on Wednesday 1st January.

Penfield Model Engineers Society Inc
Location: *Salisbury, Penfield Avenue*
Public Running: *Last Sunday*
www.picknowl.com.au/homepages/joanlynn/pmesone.htm

Tauranga, NZ

After our March 2002 open weekend, it was decided that March open weekends were becoming very popular around the country, in fact prolific. It was therefore decided that November would be a good alternative month. A date was set and being aware that our neighbours in

Whakatane are working hard to get their club and track under way, we decided to donate all profits from this weekend to their club to help — after all, we received a lot of help to get established. Early plans did not go smoothly — the char we ordered two months earlier was sold to another club two weeks before the open weekend. No more in the country and the next delivery date was two weeks too late!! Apologises don't raise steam so thankfully, our embarrassed supplier organised an alternative supply from the Waikato club — thanks Hamilton.

Early Saturday, visitors started to arrive and very welcome they were. There seemed to be an abundance of most things at the beginning of the day, except suitable coal and treated water. A quick trip to visit the shops solved the coal problem whilst the treated water is a future planning issue. Saturday went smoothly with a good flow of passengers, fuel, food, etc. Both ground and elevated tracks were well used. It was great to see the big engines making use of the ground level track. The elevated track was being used for 5", 3.5" and 2.5" gauge engines with plenty of passengers available. By 5pm, things were starting to wind down. Our Manukau visitors left for home, food for the BBQ was prepared and by 5.30pm, all locos and rolling stock were locked up for the night. The additional track in No. 3 tunnel proved a real bonus by not having to carry riding cars to the club house for storage. Also, no locos had to be stored outside over night: as the man says.....luxury! After tea Craig Moore showed us a video of the NZR (full size) W^{AB} locomotive under restoration in Fielding making its first run. What a great sight!

Sunday dawned with similarly good weather and we welcomed six more Whakatane members, including Dave Fitton with his F^{A} locomotive. Passenger flow was steady over both days. At the end of it all, we were able to send a cheque for $700 to the EBME Club. Thanks to the clubs that supported our open weekend.

Tauranga Model Marine and Eng. Club
Location: *Memorial Park, Tauranga*
Public Running: *Every Sunday*

Upper Hutt NZ

Our ground level railway was formally opened on Saturday, 18th January by His Worship, Mayor Wayne Gurry, Mayor of Upper Hutt. As well as cutting the ribbon, the Mayor rode on and drove most of the engines we had on site and talked enthusiastically with the builders and owners of the locomotives. We were able to show him a good variety of engines: petrol-hydraulic and coal fired and gas fired steam. The Mayor was keen to make a return visit and bring his children for a ride. We certainly appreciated the time he made available to us, his interest, kind comments and his courtesy in opening our new track.

Maidstone Model Engineering Soc. Inc
Location: *Maidstone Park, Upper Hutt*
Public Running: *Every Sunday afternoon October-April*

Warner, QLD

The new ground level line is slowly making its way around the site and has passed the signal box on it's way to the first of the two new trestle bridges that will span the new and existing lines. The timber supports for the first of the new bridges have been placed and work will progress over the coming months to build the superstructure ready for track laying. The replacement of the steel supports on the elevated track with concrete has been completed and new track has been laid and tested ready for the March running day. The roundhouse purlins are being installed in readiness for the roof to be placed.

At our recent AGM the following were elected to office for the ensuring year. President Don Bell, Vice President Noel Eberhardt, Secretary Don Hutchison and Treasurer John Andrews. The committee voted Anita McDicken as the recipient of the Chris George Memorial Shield (Clubman of the year) for 2003. This award is given in appreciation to those persons who tirelessly give of their all to the club.

Remember our **"TRACK AND TENT"** Run in August. Details are in the Coming Events column on the next page.

If you are ever up our way we would welcome a visit. To visit our site, Contact the Secretary, PO Box 322 Everton Park 4053. **Note:** All persons wishing to run equipment at our site must have AALS Insurance.

Qld Society of Model & Experimental Engineers Inc
Location: *122 Warner Road, Strathpine*
Running Day: *2nd Sunday except December, by invitation. No public running*
www.tracksandtrains.com/qsmee

West Ryde, NSW

November was our time for the Malcolm Sargent Cancer Fund runnig day. The afternoon started slowly as there were not the number of party groups we have been used to so there was plenty of free space. On the elevated track, we had a steady stream of passengers all afternoon. Mick Murray with *Tinkerbelle* hauled two cars and a van and travelled a distance of more than 14 kms, during the afternoon. On the outer track was John Hill with his petrol-powered 44 Class 4469. John has been a rather regular driver on our running days — he had been specially invited in case of a fire ban and was presented with a club shirt in recognition of his services. The afternoon gave a total of 1,785 rides and the five assistants from the Malcolm Sargent Cancer Fund group seemed to have enjoyed the experience helping out for the afternoon.

December was another quiet day and this gave an easy afternoon for 680 rides. The day was rounded off with a BBQ for some members and take-away for others.

January was a day of total fire bans, reaching 42 degrees in the shade. We were not able to offer any services so the few visitors were entertained by Zac Lee taking David's Ruston for a few laps. On the loco and rolling stock news: Henry Spencer's Shay, Warwick Allison's V class and Andrew Allison's A10 boilers have all been hydrostatically tested, stamped and approved. With the addition of Ken Baker's J class boiler, this is a very pleasing splurge of boiler building. Barry Tulloch with the help of John, had produced some nice CAD drawings for a K class boiler. Ken has also shown his J class cylinder fabrication in Bronze and most recently, his exhaust piping for the cylinders. David Thomas showed some pieces for his South Australian 620 class locomotive. Roger Kershaw brought along a very fine partly built model of an O class 4-6-0 at the last Christmas Party.

Work progresses on the carriage upgrade and the painters have continued on the elevated signalling. A concrete ramp walkway with galvanised steel plate covers over the point rodding and cross-over has been completed. The carriage shed now has its road numbers whilst the track at the bottom of the grounds has benefitted from some packing and lifting. Fence replacement has been the order of the day and members turned up in force to remove the old fence. The first Wednesday of each month is now being used by a number of members for a private run and BBQ lunch.

Sydney Live Steam Locomotive Society
Location: *Anthony Road, West Ryde*
Public Running: *3rd Saturday (pm)*
www.pnc.com.au/~wallison/slsls.htm

2003 Club listing updates

The following clubs have realised that some information in the listing in the last issue is out of date. Please amend your list accordingly —

Ballarat Society of Model Engineers Inc
- INVERMAY, Sports Complex, cnr. Muscatel Sreet and Swindlers Road

Bankstown Steam Locomotive Society Co-Op Ltd,
- P.O. Box 24, North Revesby, NSW 2212
- Email address: torch@accsoft.com.au

Katanning Miniature Railway Inc
- KATANNING, Cnr. Clive St and Great Southern Highway
- 18 Beach Street, Katanning W.A. 6317

Timbertown Steam & Oil Engine Club (Inc)
- WAUCHOPE, Bago Siding, Timbertown Heritage Village
- First full weekend of month (Sat & Sun)
- The Secretary, P.O Box 1857, Port Macquarie, NSW 2444
- www.oilyandsteamy.com

Farewell

We say goodbye and thankyou to these model engineers who have passed on:

Steve Berkeley (Auckland SME)
John Bullen (Bendigo SME)
Harry Holland (Hutt Valley MES)
Maurie White (SLSV Moorabbin)

and extend our condolences and best wishes to the family and friends they leave behind.

Coming Events

29 April to 14 May
North Queensland Safari — various s

The Northern Queensland Safari goes west this year. The itinery is Maryborough 29 April, Rockhampton 1 May, Mackay 3-4-5 May, Barcaldine 10-11 May, Toowoomba 14 May (normal run day 18th May). Contact Neil MacKenzie (07)3261 2042) or e-mail: norma.mac@bigpond.com

17 to 18 May
Blowfly Rally and Birthday Invitation Run — Mudgee, NSW

The Mudgee Miniature Railway invites all *Blowfly* owners and builders, model engineers and interested people to come to Mudgee for the 11th annual Blowfly Rally. Saturday is private running (no public) with a BBQ tea and night running while Sunday is a public running day. While we are aiming for as many *Blowfly* locos as possible, we are combining it with our birthday run so anyone who wishes to run any other type of loco, steam, petrol or electric, is more than welcome. There is plenty of room for on site camping (no power). Anyone wishing to arrange accommodation in Mudgee contact the Mudgee Visitors Centre (02) 6372 1020 or Freecall 1800 816304 or website: www.mudgee-gulgong.org for further info. For catering purposes it would be appreciated (not compulsory) to advise the club if attending at PO Box 373, Mudgee NSW 2850. For further details & info. please contact Sec. Peter King on (02) 6373 3626.

17 to18 May
Roadsteam Event — Inverell, NSW

Inverell Pioneer Villiage Autumn Run for all Roadsteam engines running or static exibit. A BYO event. Come along and help break the drought. To be held annually on the third weekend in May. Mark it on your calendar and contact Gordon (02)6722 4272 or Peter (02)4951 2369

17 to 18 May
Annual Kindred Society Run — Moorabbin, Vic

This year's theme "Come and Play Trains". 3.5" gauge loco's especially welcome! and of course 5" and 2.5" gauge O gauge and 1 gauge track is also operational. Please wear your club I.D. and bring your boiler certificate. Lube oil and char provided. Morning and afternoon tea provided and BBQ lunch on Saturday also provided but please let us know that you are coming so that we can cater for you! Steam Locomotive Society of Victoria. Club track Rowans Road, Moorabbin Vic. Enquiries to Ken Rofe (03) 9580 1408 or Graham Plaskett (03) 9750 5022

17 to 18 May
10th Birthday Open Weekend — Thames, NZ

Thames Small Gauge Railway invite all model engineers and their spouses to join in celebrating our 10th Birthday. 900 metres of 5' and 7.25" ground level track on the Thames foreshore is in pleasant surroundings on the Brown Street reserve. A birthday dinner is planned for the Saturday evening. Registrations essential. Visiting locomotives welcome. Boiler certificates required for steamers. Contact Secretary, Phil Macdiarmid, 454 Kauaeranga Valley Rd, RD2, Thames Ph 07 868 9914

31 May
NSW AALS Interclub Day — West Ryde

Everyone is welcome to the NSW Interclub day on 31 May 2003 at the Sydney Live Steam Locomotive Society grounds at Anthony Rd. West Ryde. Locomotive unloading access via Park Avenue.

7 to 8 June
Steam, Horse & Vintage Rally — Echuca, Vic

This year this well known and popular Rally is 40 years old! It currently attracts over 700 exhibitors with items as diverse as steam engines, tractors, oil & petrol engines, commercial vehicles, cars and heavy horses and stalls for books, crafts and engineering items. Model engineers are especially invited this year to exhibit and operate models of all types and to use the 5"/7.25' railway, boat pond and steam shed. See *Letter Box* page for more details. For entry forms (03) 5482 4126 and accommodation (03) 5480 7555.

7 to 9 June
Hot Pot Run — Wollongong NSW

Illawarra Live Steamers is holding its 9th Annual Hot Pot Run over the June Long Weekend. Enjoy a wintery weekend warming up with steam trains and continuous steamy hot soup. Have an enjoyable weekend with over 50 locomotives and rolling stock, night running. Entry fee at least two cans of soup per person for the weekend. Camping on grounds and area for caravans with hot shower. For further information contact ILS Secretary on 0410 569 663, e-mail dgbunker@acay.com.au or look us up at www16.brinkster.com/ils25000

22 June
Bracken Ridge Central Steam Railway

Be a part of the Anniversary of the Bracken Ridge Central Steam Railway. Now in its eighth year the railway draws a varied range of locos for the enjoyment of the public. Drivers and crew will be catered and Awards will be made for the Best Presented Queensland Loco and Best Open Class Loco. Contact Neil Mackenzie (07) 3261 2042

5th and 6th July 2003
Timbertown Steam Festival — Wauchope, NSW

Yes, our annual rally is on again in Timbertown, Wauchope. 250 metres of ground level 5inch and 7.25 inch track (steaming bays are under construction). Steam and Oil Engines. Contact Ian Strawbridge (02) 6587-4455 or www.oilyandsteamy.com

5 to 6 July
Bendigo Model Engineering Exhibition

Bendigo SME invites you to attend and take part in the biennial Bendigo Model Engineering Exhibition. It will feature numerous displays, working models, demonstrations and a range of stalls selling modeling tools, books and engines. The venue is again the Kangaroo Flat Leisure Centre, Browning St, Kangaroo Flat. Admission: adults $6.00, children $2.00 and families $12.00. For further info. and entry forms please contact secretary Ray Hayward (03) 5442 4500 or Gordon Hunter (PR Officer) (03) 5443 4887, mob. 0413 936 790, email: huntergj@iinet.net.au

8 to 10 August
"Track & Tent" Run — Warner Qld

QSMEE extend an invitation to kindred societies to join us at our Warner track site for a run in the pleasant Brisbane spring with warm days and mild nights. August is also one of the driest months. The track will be open for private running only — no visitors from the public. Also it means that there is no clash with other SE Queensland society running days for those wishing to run on other tracks and it is the first weekend of Brisbane's RNA Exhibition. Preliminary Programme is: Friday — evening welcome, nibbles and refreshments, Saturday — day and night running, light lunch, evening barbecue, Sunday — breakfast, day running, light lunch and farewells. There will be nominal charges for light lunches ($2), BBQ ($7) and breakfast ($3), camping on site and bottomless tea and coffee. To run equipment you must have boiler certs. and evidence of AALS insurance when you arrive to register. Information has been sent out to clubs. For further details contact Hugh Elsol, (07) 3849 5573.

30 August
NSW AALS Interclub Run — Edgeworth NSW

The Lake Macquarie Live Steam Locomotive Society are hosting this run.

4 to 6 October
Centenary celebrations of Old Casino Station and 13th Birthday of Pacific Coast Railway Soc. — Casino, NSW

The members and friends of the Casino mini railway extend to all model engineers and their families, to train buffs of all persuasions, and to shutterbugs with all types of cameras, an invitation to attend the celebrations of the 100 year old original Casino Station building and the 13th birthday of our parent society commencing at North Casino station on the corner of West St and Queensland Rd. Our 7.25" and 5" gauge track which winds its way through two kilometers of wetlands with abundant bird life before climbing up and around our famous 1in 40 Norco bank and curve to arrive at the oldest wooden station left in northern NSW, which is now a museum of railway memorabilia. MORE DETAILS in the next two issues. See our website at www.casinominirail.com/

17 to 19 October
15th Australian Miniature Traction Engine & Road Steam Rally — Wauchope, NSW

To be held at the historic Timbertown Heritage Village, this year's rally is in the perfect setting for fans of steam and old machinery. Don't leave it too late to book your accommodation. See the notice on page 23. For full details contact Paul Stanley (02) 6587 5188 or email: stanleymob@aol.com

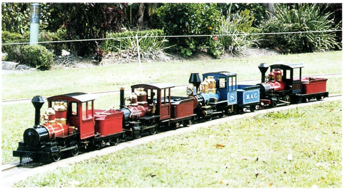
8 to 12 January 2004
Steam & Steel 2004 — Hamilton NZ

The Hamilton Model Engineers are hosting the next New Zealand Convention. Full details appeared on page 57 in the last issue. For more information about this great event contact Valerie Clarke at 51 Alderson Road, Hamilton New Zealand. Ph. 64 7 8551 927, Fax 64 7 8551 307 or email: bandvclark@xtra.co.nz

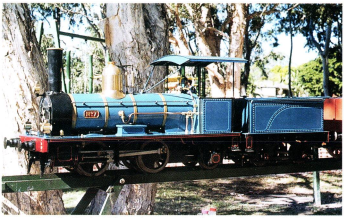
Bracken Ridge & Maryborough

What some Queensland modellers are up to!

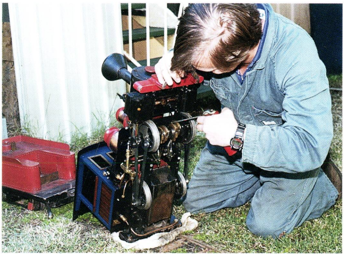
All photos by Neil Mackenzie except for the B1 taken by Dale Smith



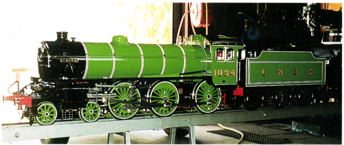
Super power in Maryborough! 4 Marie E's together



Des Pedley's A10 on the steaming bays at Bracken Ridge



Paul Jones shows the advantage of having a small loco



MELSA member Dale Smith (Barcaldine) has built an outstanding B1

Warren Starr drives Merv Feaney's 0-6-0 at Bracken Ridge

Paul Jones, driving Neil Mackenzie's A12, and Terry Phillip on his BB18$^1/_4$ haul a reasonable load in Maryborough's Queens Park

Jim Hurst gives his BB18$^1/_4$ a run at Bracken Ridge

Garratt Gossip

with John Cummings

Readers may remember that in issue 105 (Nov – Dec 2002) I mentioned that the Tasmanian Railways have put all their Garratt drawings on microfiche. In mid February I received an e-mail from Max Kempson of New Zealand to say that he e-mailed the contact person in Tasmania to be given a new contact. Max advised that the contact is Christine Beresford, e-mail: ChristiB@naa.gov.au

The "K" class drawings are on one roll BUT the L, M, G, Q and R classes are on a separate roll. Copies are produced by a company for the Archives and they bill directly to the customer. Cost is AUD $40 per roll posted to anywhere in Australia.

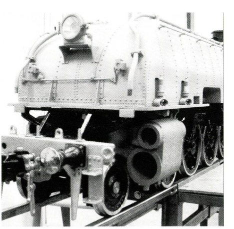
O gauge Garratt

Last October I visited the Hornsby and District Model Engineering Society on their birthday weekend. There on display was this gauge "O" Garratt loco built by Roger Hattersley. Roger informed me that LBSC designed and published it in the March 1958 issue of the *Model Engineer* under the title *Steam Mice.* Should anyone would like a copy of this article, contact me on my e-mail address. The cost would be the price of photo copy plus postage and packaging. One of our drafters has offered to redesign the *Steam Mice* and build one, so if any one is interested in building a redesigned *Steam Mice* please hang out for the time being.

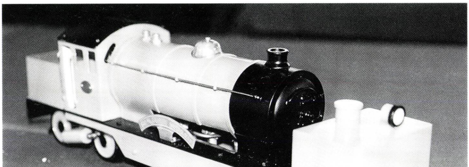
AD60 Garratt in the USA

In *Garratt Gossip* issue No 103 (July 2002) I did ask if any of our readers tell me what has happened to Lyle James' AD 60. I received an e-mail from Trevor Heath in the USA (the new owner).

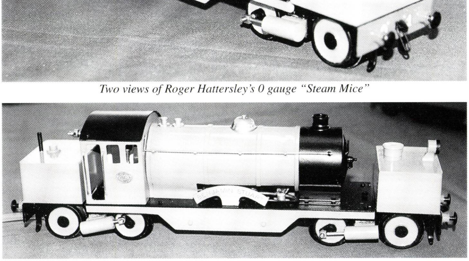
"We are making progress with the 1.5" scale 7.5" gauge AD60 acquired as a kit of parts from Lyle James, but no, it is quite a way from being completed. There was almost no machining performed in NSW and of that which was completed, some had to be re-done to comply with IBLS standards and more still to convert the loco to 7.5" gauge. Current short term goals are to have it sitting on its wheels for the local train show here in November and to have the new 150 PSI steel boiler ready for hydro testing by the end of the year (2002). These goals are quite achievable at this time with both chassis now fully machined ready to accept the wheel sets. All 16 drivers have received new tyres , all four bogies have been rebuilt to 7.5" gauge with new steel tyres. The boiler is getting close to being finished. This AD60 will be propane fired, mainly because of the availability of good coal over here."



Front view of Trevor Heath's AD60



Two views of Roger Hattersley's 0 gauge "Steam Mice"

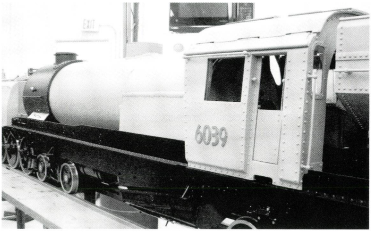


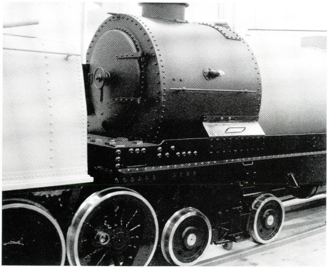
The photos of the AD60 from Trevor are more recent than this report, and show the progress made and the excellent standard to which the loco is being built.

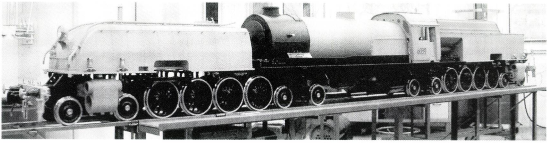
The pinhole grate

Readers will remember that January, 2000, issue 88 I wrote about Keith Bradford's pinhole grate, and gave dimensions for it. Well, in early 2002 I made the grates for the K's according to Keiths dimensions (don't ask how many holes I drilled because I can't remember and I don't intend to go down to the workshop and count them). Anyway, after having made the grates, for the K's I thought to myself "why not make a grate for my 35class loco" so I went ahead and made one with 140+ holes in it. At the first steam up of the 35 with this new grate it produced steam satisfactorily but when stopped it needed a fair amount of blower to keep the fire burning. I took the grate out and opened out the holes from .125" to 3.5mm.(0.137" — that is the beauty of small metric drills they go up in steps of 0.1). Ha! Now this did make a difference to C35 the next time I fired up, with 3 carriages it gave improved fuel and water consumption. With the old grate the safety valves were forever blowing off, so I was forever turning the injectors on. Now I fill the boiler up to ˘" below the top nut on the gauge glass, stuff the fire box up to the bottom of the door and away I go, $1^1/_2$ laps (.5km) later around Wascoe Siding, I turn on the injector and a few shovels of char into the firebox — this is enough until I pull into the station. This is a 1 kilometre journey. During this time the safety valves are just below the point of blowing off.

I have since discussed with Peter Wardle as to why the hole size to Keith Bradford's







Three more views of Trevor's 7.5" AD60, which, as can be seen, has progressed well. It will look great steaming on the rails at Kitsap Live Steamers.

dimensions did not preform satisfactory. We came to the conclusion that on the Garratt the ash pan is open on all sides whilst on the 35 the ashpan which is between the frames is open only front and back so there is not as much air circulation as on the Garratt.

Flexible jointing

For anyone looking for stainless steel convoluted tubing (flexible jointing) for their Garratt, here is where you should go.

Senior Flexonics Australia, 2 Lindsay Street, Rockdale NSW 2217 Australia.

Email: sales@flexonics.com.au Mark it "Attention Ken Hubbard."

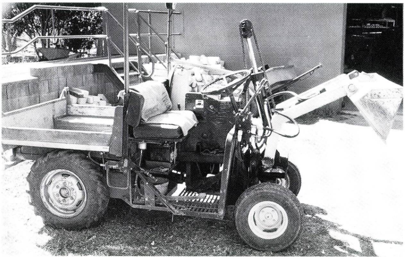
That's it for now!

John's email address is jandpcum@pnc.com.au

The "Moon Buggy"

by Bob Neal

This is a story about a piece of machinery that is used extensively, almost daily and does an enormous amount of work at Lake Macquarie Live Steam Locomotive Society. I suppose most clubs can boast a member who has great ability to improvise, indeed most model builders resort to improvisation at some stage or another of building a model. But I believe the Lake Macquarie club has a man who would be hard to beat. He is Bob Purcival, the builder of the 'Moon Buggy'. I quote Bob's description of the construction and parts used in the buggy.

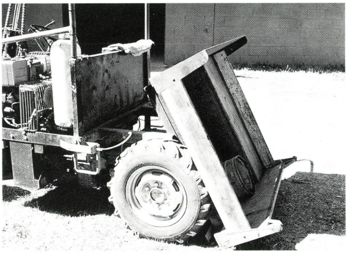


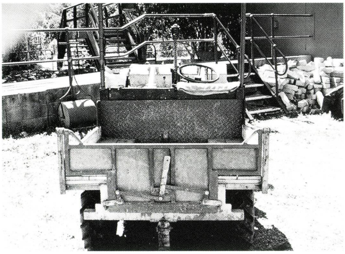
"The concept originally started out as a Grassland ride-on mower. The mower was powered by an 8hp Honda 4-stroke motor, was single speed and extremely harsh on belts. The single speed of the mower was very unsatisfactory, so I fitted a 5-speed gearbox to the mower, making it far more user friendly. Eventually the mower went past its use by date and the directors decided that because the gearbox belonged to me I was to take it back, along with the rest of the dilapidated mower."

Bob, being the resourceful person he is decided that the motor still had a few breaths of life left so he decided to build a buggy using the Honda motor. Bob said his initial idea for the buggy was to build a runabout for club member Les Lamb, to transport him around the grounds, which were continually expanding. Les's pace had changed in comparison with the 38 class locos that he once operated, back to the pace of the Newcastle Council steam roller he had driven in his early days. Bob thought that the buggy would allow Les to keep up his high level of ground maintenance.

So Bob set about constructing the buggy:

1. The frame was made from scrap RHS and pipe. The 8hp Honda motor was used, this was coupled through a reduction shaft to a Toyota 4-wheel drive gear box, complete with high and low range (which gives 6 forward speeds and 2 reverse) and this in turn was connected to the rear diff which came from a Nissan heavy duty van. One axle was shortened to suit the size of the buggy.





2. The drive from the motor is by two V belts to the reduction shaft which is connected by chain to a Nissan Z2000 van fly wheel, which carries the clutch and is matched to the Toyota gear box.

3. One V belt from the motor is longer than the other because it also drives the hydraulic pump, which is a power steering unit from a Holden car.

But let's start at the front of the machine.

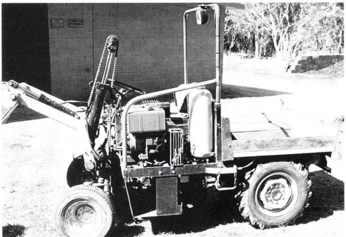
- The bucket is a cut down battery container from an electric forklift.
- The cutting blade on the bucket is a worn out blade from a bobcat welded onto the scoop back to front.
- The tilt cylinder on the bucket came from an old 1970 model Komatsu forklift. This cylinder was rebuilt. The lift cylinder was donated by a coal mine worker who was going to build a wood block splitter but changed his mind.
- The chain used to lift the bucket is made up of short lengths of Komatsu forklift chain joined together.
- The hydraulic oil tank is a recycled fire extinguisher purchased at the local dump for $2.00.
- Mini Minor wheels mounted inside out to give clearance, are used on the front.
- The front axle and king pins are ex hydraulic ram shafts.
- The steering rack is a cut down unit from a Morris 1500 of around the Elite Major vintage.
- The wishbones and front end are all fabricated.
- The drag link is a piece of reo bar.
- Bob said he did not know what the steering wheel was but it came from a wrecked boat.
- With the first braking system the Nissan master brake cylinder was used to operate the tail shaft brake; this system proved unsatisfactory, so a second-hand Nissan differential was purchased from the wreckers.
- The backing plates and brake drums, etc. were fitted to the existing diff and the brakes now operate on the back wheels which is much more efficient. The hand brake came from the Morris 1500.
- When first built, the buggy was a little light on its feet so 250kg of 2" plate, bought at scrap price, was installed over the diff, and this solved the wheel spin problems.
- At the rear of the buggy is a ute style tray with a self-closing tailgate. The tray is so hinged that when a locking lever is released the tray can be lifted by hand, even when loaded, to dump the contents.
- But there is more. The Honda motor deteriorated such that eventually after years of work, one passer-by made the comment "that he didn't know Honda had made a diesel motor" to which Bob replied "Mate, it's not a diesel, it's a 4-stroke."

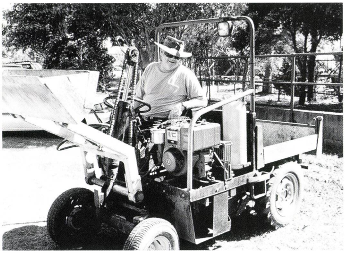
By this time the machine had proved its worth and versatility and the realisation that it couldn't be done without, so the question of a new motor was discussed. El Presidente, Jeff Wakeham came to the rescue by announcing that h had a brand new Briggs & Stratton motor in his workshop still in its packing crate. Jeff had acquired this motor from a grounds contractor at a power station who had lost his contract and sold off or gave away all his equipment so as to clean up his site depot.

The new motor was fitted, providing much more power so Bob altered the gearing to suit, making it much more user friendly.

I doubt if there is any commercial vehicle on the market that would be as versatile or as handy as Bob's Moon Buggy and it is always wonderful to see what can be achieved by lots of imagination and inspiration. I believe it's this type of activity and effort that enhances club camaraderie.

(The club now has a new addition to the fleet called "Moon Raker" which has been usd to smooth and form access roads around the park, inluding the new traction engine track ... Ed.)





Update on *Red Fred*

by Dave Harper

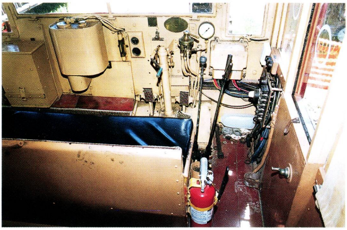


Photo 1

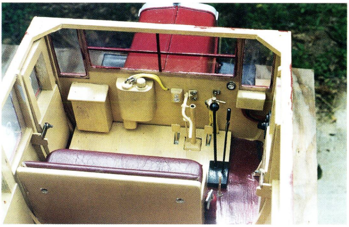


Photo 2

In *AME* No. 94, Jan/Feb 2001, I recounted the story of the QR diesel railmotor RMd55, known as *Red Fred*. These days he resides at the ARHS museum at Rosewood, west of Ipswich, Qld.

I built a 1/8th scale model to run on 5 inch gauge track, and also built a box wagon which contained the electric motor, battery and radio control unit which powered the whole outfit. It ran well, and created quite a stir when I ran it the first time at the Easter Convention 2000, held at the QSMEE Warner track.

When my interests moved on to model planes I found storage space in short supply so *Red Fred* was sold to Alan Houston, a well known local modeller with his own track running around his property in the Sunshine Coast hinterland.

Alan was very happy with *Red Fred*, and as far I as knew was happily running him unchanged. I was somewhat baffled, therefore, when Alan phoned me in late 2002 and told me that he's finished *Red Fred* and would I like to come up and see him?

When I queried what he meant, Alan explained that he'd incorporated some extra details beyond what I had built. This seemed fair enough, so shortly after my wife Sandy and I paid a visit to Alan and his wife Pat.

When Alan took me out the back and showed me *Red Fred*, I was absolutely staggered! Alan hadn't just added a few details, he'd created virtually a museum quality model on the bare bones I'd sold him!

While I'd made no claims to have built a super detailed model, I was quite satisfied that it was a pretty fair representation. However, Alan has taken the whole thing way beyond anything I would have contemplated! For instance, **Photos 1,2 and 3** show respectively the drivers seat and controls in the full size, how I modelled it, and how Alan super-detailed it! Apart from the instruments etc., note also the window winder and strap on the door — Alan added these to each of the seven doors! **Photo 4** is a better shot which also shows the door restraint strap.

The major surprise I had was when Alan lifted the bonnet. For a start it didn't hinge both sides when I made it, and the engine was conspicuous by its complete absence! **Photos 5 and 6** show the exquisite motor, complete in every detail! Also visible in photo 5 are the opening side windscreens and working sidelights! The headlight is also to scale and operating.

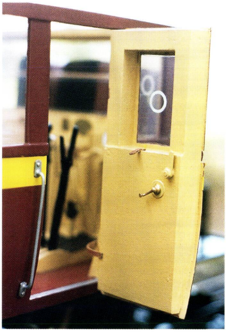


Photo 4

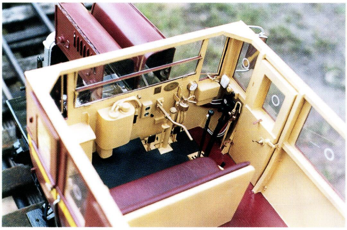


Photo 3

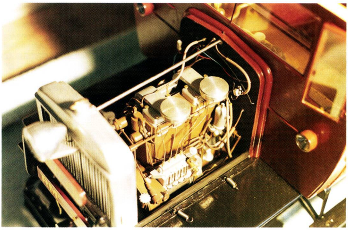


Photo 5

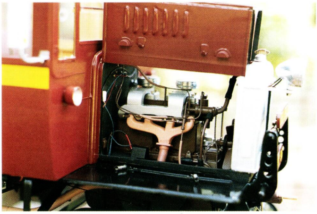


Photo 6

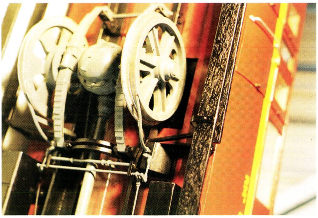


Photo 8

Another thing I noticed straight away was the difference in the big rear wheels — mine were very rudimentary as was the whole back axle assembly — see **photo 7**. Compare that to **photo 8**! Same wheels, but completely reworked and fitted with brake drums and drive shaft, etc.

Photos 9 and 10 show that the complete transmission and brakes , plus air compressor and cylinders are now all faithfully reproduced. Alan said he had some doubts whether the exhaust pipe would fit in properly, but it did, which proved that I'd built the chassis pretty close to scale!

Not content with super detailing *Red Fred*, Alan also worked over the A wagon, fitting handrails and door slides, etc. plus improving on the electrics and radio control installation. **Photo 11** is as I built the radio control gear, with dry batteries powering the receiver and a big reduction in the drive to the speed control rheostat. **Photo 12** shows the bigger pulley on the rheostat and the voltage regulator that uses the 12v drive battery to give 6v for the radio. Alan also fitted another servo to operate the lights.

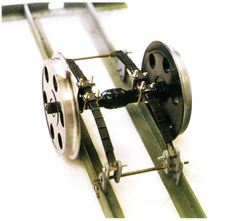


Photo 7

Just to rub in my inadequacies, **photo 13** shows how Alan properly engineered the chain drive with screw tensioners for the chains all mounted on a steel plate. Don't you hate some people?

Talking to Pat over morning tea, she told us that Alan had made many trips to Rosewood, and had crawled all over *Fred*

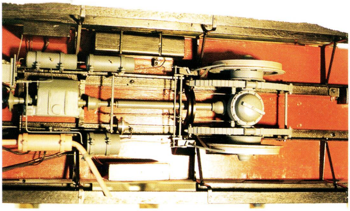


Photo 9

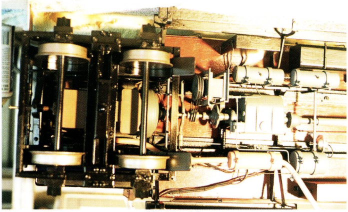


Photo 10

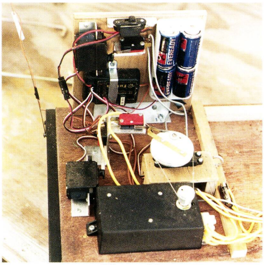


Photo 11

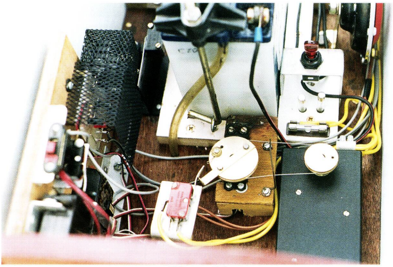


Photo 12

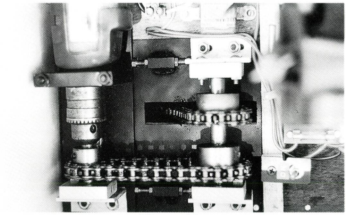


Photo 13

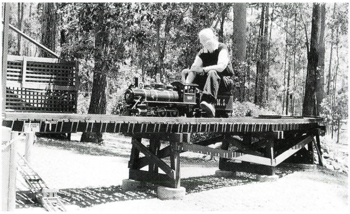


Photo 14

Photo 15

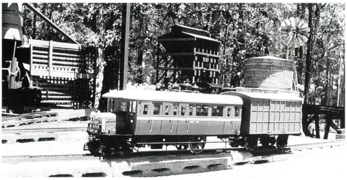


Photo 16

with camera and measuring stick. This enabled him to collect all the information he needed to 'finish' this now remarkable model. Alan said he was very grateful to the ARHS members who made him welcome on all his many visits. I found them equally helpful during my earlier visits.

Apparently all this detailing made a great change for Alan from the usual model engineering work, which is mostly machining and metal work. Many of the engine and other parts were made from a chunk of camphor laurel timber that he acquired from some local wood turners. He is so taken with this kind of modelling that his next project is to be the old Panhard railmotor, RM14, currently sitting in the newly opened Ipswich Railway Workshops Museum. I was pleased to be able to furnish Alan with some drawings, etc. of the Panhard, because I had exactly the same idea! I'm sure he will do a much better job than I could.

Alan really has a great set-up complete with turntable, unloading ramp, scale coal staithes and water tower, plus a lovely curved timber viaduct seen in **photo 14**, with Alan astride his favourite loco, a Baldwin 0-6-0 switcher built by Jimmy Jackson.

Photo 15 is an evocative shot of *Red Fred* coming round the curve with all lights blazing, including the internal light! The reborn *Red Fred* and A wagon are seen in **photo 16** standing in front of the coal staithes and water tower. What a great setting!

Photo 17 shows the turntable area, with the *Marie E* in the foreground. **Photos 18 and 19** are two of Alan's own inventions, his track cleaner driven by a whipper snipper and the track gauge that shows gauge, gradient and super-elevation all at once. I think our editor could do well to persuade Alan to write an article about the last two!

I'd like to thank Alan and Pat for their hospitality, and to congratulate Alan on turning my mediocre model into an outstanding one.

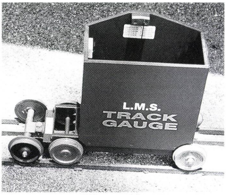


Photo 18

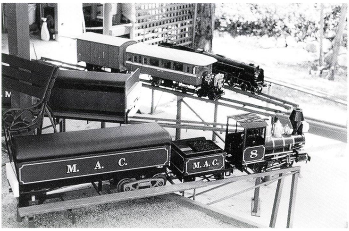


Photo 17

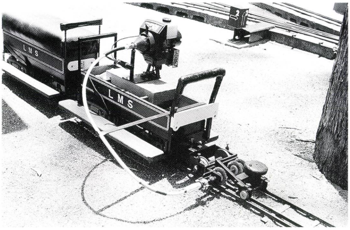
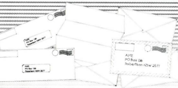


Photo 19

Letter Box



Rally call to model exhibitors

Sir,

From small beginnings 39 years ago, the Echuca Steam, Horse & Vintage Rally has grown to become one of the major events of its type in Australia.

The Rally is the second oldest in the country. This year we celebrate our 40th Rally and wish to particularly encourage model engineers to exhibit.

Currently attracting over 700 exhibitors, this year will see all the traditional attractions, featuring steam engines, tractors, oil and petrol engines, commercial vehicles, cars and heavy horses. In addition several new features will be added including a "Built in Australia" section and a Junior Engineers exhibition and encouragement award.

Always held on the Queens Birthday weekend, thousands of visitors enjoy the old time ambience, family entertainment, craft, book and engineering stalls. The Grand Parade is a feature and the Australian Dog Singing Championship is a lot of fun.

The Echuca has always encouraged model engineers to exhibit and operate all types of models. On site is a 5" and 7.25" miniature railway, a model boat pond and a steam shed where models of stationary steam engines can be set up and steamed. There is plenty of room and challenges for model traction engines and steam wagons.

In this celebratory year we particularly wish to invite model engineers to exhibit, enjoy the Rally and the many other attractions of Echuca, including the largest fleet of paddle steamers in Australia.

Your attendance will be most welcome. Dates: Sat 7 and Sun 8 June 2003. Entry forms (03) 5482 4126, accommodation booking (03) 5480 7555.

Warwick Turner

Goldfields pump drawings

Sir,

Way back in 1978 I wrote to Worthington & Simson and obtained a very comprehensive group of original manufacturing drawings relating to the Pumping Engines used in the Goldfields water supply scheme that dates back to the turn of the 18/19th century.

My request for these drawings was intended to assist me to build a scale model of the above mentioned pumps. However, what with heavy work load commitments and in more recent years, health problems, I've not been able to proceed beyond dreaming, lastly age has now beaten me!

I now wonder if any reader of your magazine may be interested as these drawings are still in excellent condition and cover the whole layout, i.e. general layout, sectional and detail components and boiler, with large and small components detailed for the manufacturing workshop — everything is set out well. A good detailed working model is achievable from these drawings.

Could you please place the contents of this letter in your next edition that I have the above for disposal. To cover my original expenses I will accept $150. Aust. delivery free via courier.

Henry Ewins

New Zealand

(Anyone who is interested in these drawings please contact the AME office and I will forward your details to Henry ... Ed.)

Rail head radius

Sir,

One must wonder whether the numbers quoted in "Rail head radius" (last issue) are correct. I can see a "fine scale" engine running on 95% of the club tracks ... but only on 5%?

If this is the case then maybe Mr Elliston has not followed the standards as recommended in the AALS Codes of Practice. There are many fine miniatures in varying scales who do not seem to have any trouble negotiating the many "flat bar" tracks, not only in this country but throughout the world.

By using a good quality steel for tyres, no matter whether you cone or parallel the treads, it appears to make no difference in performance and the wear is very little. They will probably outlast the builder.

Of course, it is great that Mr Elliston's club can afford the cost of "scale rail" and he has worked so hard to get the track, wherever it is, up to such a high standard for his engine. As the Editor rightly points out, the average club cannot afford the higher cost of this material nor is it very suitable for laying in open parks, etc.

We all look forward to seeing this engine around the traps. Having been to the WA 2004 Convention location, I can assure him he wouldn't have any trouble with running there.

Barry Glover

New South Wales

Sir,

Nowhere in my letter, issue 107, page 63, nor in Alex Russell's letter were (a) replacement of existing track or (b) the running of coned wheels on flat tracks referred to.

The subject of both letters was rail head radius, or more accurately the absence of it. We locomotive builders are given by AALS precise wheel profile specifications which I have adhered to. Track layers are also given by AALS track specifications which they do not adhere to. Here is the dichotomy, in Euclid's Theorem, "a right angle into a radius won't go".

Solution! An angle-grinder (designed to grind angles!) mounted on a truck, run around the track once each way, to remove the aris and leave an approx. 2mm x 2mm x 45° angle instead of the damaging right angle. Problem solved in an afternoon. Cost peanuts.

What was acceptable practice for 2.5" and 3.5" gauge track is entirely unacceptable for 7.25" because the 'cube rule' dictates that flange loadings are enormous by comparison. Finally, what 99.99% of other loco operators do, in this country or any other, is not the criterion.

Robert W Elliston

Victoria

(Robert, in your previous letter you asked "what are clubs going to do about it?". My reference to replacing track and to coned wheels was directed at what really are the only two solutions open to established clubs — they live with what they have or they replace it! With due respect, I would suggest the idea of grinding a 45° angle on the inside top of the track is not terribly practical (my club would need a power lead about a kilometre long), but it is also dangerous. All that is being achieved by this method is the creation of a "ramp" which flanges will very easily climb, especially in a curve where the wheel exerts most of its force against the outside rail. I have seen this happen where unintentional angles of the type you suggest have occurred on the top corner of the rail. The result, not surprisingly, is a derailment. The subject of your correspondence is RADIUS. If your solution would create a radius instead of an angle it could be a good one for some clubs, though it would appear that the clubs are generally happy with what they have. Views from readers are welcome ... Ed.)

Letterbox Contributions

You are welcome to send letters by **mail** to: PO Box 21, Higgins, ACT, 2615 or

fax to: (02) 6254 1641 or

e-mail to: amemag@bigpond.com

As far as possible, *AME* is an open forum for all members of our hobby. Therefore, all expressions of fact or opinion as long as they are not libellous will be considered for publication.

Please type or clearly print your letters, as script is often difficult to interpret. Due to popularity of *Letter Box* and limited space, letters of 400 words or less will have a better chance of being published.

Bouncing ball bearings

Sir,

This query does not come under the heading of "model engineering" but I am sure there are readers who are interested.

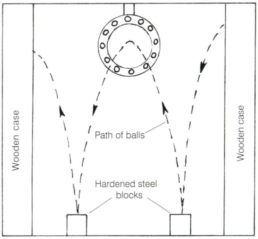
Fifty or so years ago at an industrial fair in Brisbane I saw a machine made by one of the ball bearing manufacturers (SKF, I think) which I found very interesting. This machine was in a glass case about 3' x 3' x 15" and the mechanism was in two wooden cases 3' tall x 15" x 6" enclosed in the glass case. Now to the fascinating bit — from a hole near the top of one wooden case steel balls about $^{7}/_{16}$" dia. fell down onto a polished steel block, from which they bounced up in an arc which took them through the centre of a suspended and rotating ball race. The balls then fell onto another polished steel block and bounced again to disappear into a hole in the 2nd wooden case.

I've been told that machines using this principle were used to sort steel balls, as any that were misshapen would not bounce accurately and thus were automatically culled out. But I think the machine I saw was built as a novelty — an elaborate executive toy.

Fascinating mechanisms have long been of interest to me, so some fifty years after I saw the machine described I decided to build one. To say that I've had some problems is a great understatement. I did eventually build a machine that works reasonably well but the path followed by the bouncing ball is nowhere near as predictable as it should be. Even getting the ball to fall onto precisely the same spot on the first steel block is difficult.

I'm hoping that if you will publish this I may be able to make contact with someone who can suggest improvements that could be made to my machine, or maybe someone might like to experiment with one of their own.

Nev Morris
Queensland



Ball race rotation timed so that it was at right angles to the path of the ball to allow it to pass through. I imagine the steel blocks were adjustable so the balls would bounce at precisely the corrct angle.

Sparks 'n' Arcs

Notes on traction and a circuit using batteries

by Mike Tyson *(with some input from Kent Learned)*

The most asked questions in regard to electric traction are categorized as follows:

1. What do I use for motors?
2. What Modifications?
3. Power source?
4. Control?
5. Mechanics?

1. The most common type are old car generators. However these are becoming more difficult to locate, and are thus prices ex scrap yards are rising. Other types include windscreen wiper and heater fan motos. New motors are very expensive, a new 'Baldor' conveyor belt motor costs $890.00. I have used these Baldor 32v DC conveyor belt motors and I have found them excellent traction motors running on 24v DC.

Anyone running a combination of any DC motors will find the "Balancing" of two motors difficult. I use the term "Balancing" to explain the running of two or more commercially produced DC motors in parallel. Production units work to a tolerance of plus or minus 5% and one motor ends up doing more work than the other.

2. The following notes only apply to the modification of shunt wound generators. None is required if you only want to drive something in one direction. However modification is required if you wish to use them for loco traction with reversing. *(This will be covered in a generator conversion article in the next issue).*

In separating the field winding from the "common" or "earth" connection, I also insulate the earthed armature brush post. **Note**: You do not need to machine the raised brush post as the track across the armature is the same. In 12" to the foot locos, staggered brush boxes are used to even out commutator wear.

3. Power sources can be batteries, generator (motor driven), alternator (motor driven). Most people use batteries. The most common in use is a 12 volt, 65 ampere hour, nine-plate car battery. These are good for 2 ° to 3 ° hours. I recommend charging around this point as a lighter and more frequent charge increases battery life. Eleven and thirteen plate batteries may be used with an increase in running time. You can use "Deep Cycle" batteries if you wish to be swayed by the advertising and you have the dollars — it's up to you. *(See box at right).*

Generator – engine set: I have used this system with ease. The petrol engine can be started by the generator, this being used as a starter motor to crank the engine and then return to its duty as a generator. This is by simply controlling the field of the generator. The output is directly connected to the armatures of the traction motors. Regenerative Braking by the engine's compression is simple.

Alternator – engine set: Much the same as with a generator, only regenerative braking is now via resistors and known as Dynamic Braking. A separate starter motor is required or the traditional rope pull.

There are 2 styles of lead acid storage battery, Automotive and Deep Cycle:

Automotive batteries are designed to deliver the very large surge of current that is needed to start a car. This is typically 200 to 300 ampheres. It then needs to be recgharged quickly to be ready for the next time you need to start the car. If you use the battery for a long time its output voltage drops lower and lower as its capacity is used up. This is why your car's starter motor gets slower the longer you crank it. All the car's accessories are actually run by the car's alternator or generator, and the battery is really only used to start the engine.

Deep Cycle batteries are designed to produce a steady output voltage throughout the discharge cycle. This means that the output voltage stays high, approx. 12v DC until the battery goes flat and the voltage then falls very quickly to nothing. This is a desireable trait for all types of continuous electrical work, as it keeps the performance of the equipment at nearly 100% until the battery goes flat. The biggest drawback is that it can't be charged or discharged at very high rates. The 30 to 40 amperes that we need for scale railway traction is well within the capability of a 65 ampere hour deep cycle battery. The second biggest drawback is the price — they cost about $240 (that is from Battery Specialties, Moorebank NSW. (02) 9824 0033 (June 2002).

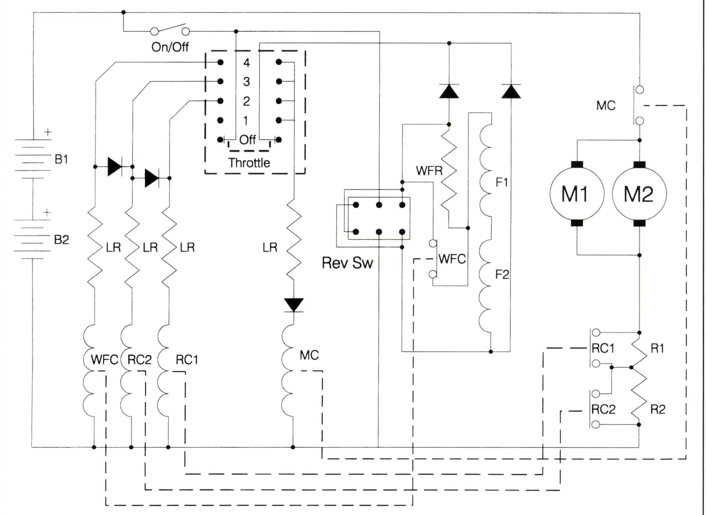
— Kent Learned

4. Many control circuits are available. Some are simple (my preferred type) or extremely complicated by the use of electronics.

5. Mechanics: I use a bogie mounted triangular system using lay shafts and $^3/_8$" pitch chain. A 12 volt car generator will produce seven foot pounds of torque at 28 amperes with a locked rotor. Thus by using a 1 to 5 ratio on the motor to axle, generator will give 35 foot pounds of torque at maximum armature current

Generator brushes: Generator are fitted with carbon brushes and as the temperature rises with use, the internal resistance also rises, with the resultant drop in applied current and the resultant drop on torque. To overcome this situation though not completely, I modify the brush boxes to take starter motor brushes. **Note**: this system along with the resetting of the neutral point of the generator was first used by Terry Geraghty of SLSLS (West Ryde) in the late sixties. He produced an excellent traction motor still running after 40 years use. (I personally find no significant advantage to resetting the neutral point.) Therefore by using low internal resistance starter motor brushes it insures full power flow from brush to armature. The downside is these brushes being softer naturally wear out quicker, but are worth the effort.

(In the next issue of* Sparks 'n' Arcs, *Mike takes us a bit further on this subject as we look at motors and generator conversion)



W.F.C.	Weak Field Contactor w/ Normally closed contacts
RC1	Resistor Control Contactor R1
RC2	Resistor Control Contactor R2
F1	Motor Field Winding - M1
F2	Motor Field Winding - M2
M1 M2	Motors M1 & M2 are 12v generators that have both ends of the field windings and commutator brush leads brought out to a terminal strip Both generators should be identical make & model
B1 B2	12 volt 65 ampure hour Deep Cycle Batteries

Hella and Narva make normally open contactors (relays) and change over relays

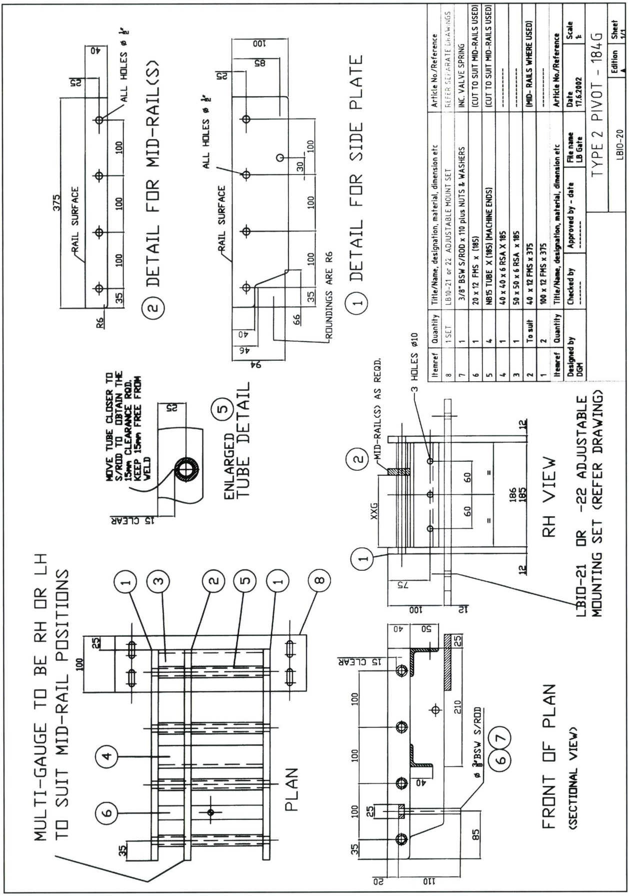
M.C.	Main Contactor
R1 R2	R1 & R2 are a 0.6 ohm 200 watt adjustable ceramic power resistor
LR	Limit resistor for using a 12v contactor on a 24 volt system. This is equal to the DC resistance of the control contactor coil.
▶	All Diodes are 1N5404
WFR	Weak Field Resistor value is 1/5 the DC resistance of the F1 & F2 in series and should have a 10 watt rating
Rev Sw	DPDT Toggle Switch, 5 to 10 amp.
On/Off	SPST Toggle Switch, 5 to 10 amp.

A Circuit Using Batteries

The LB10 Elbow Gate — Conclusion

by David Mottram

Drawings by the author, photos by David Proctor



Itemref	Quantity	Title/Name, designation, material, dimension etc	Article No./Reference
8	1 SET	LB10-21 or 22 ADJUSTABLE MOUNT SET	REFER SEPARATE DRAWINGS
7	1	3/8" BSW S/ROD x 110 plus NUTS & WASHERS	INC. VALVE SPRING
6	1	20 x 12 FMS x (185)	(CUT TO SUIT MID-RAILS USED)
5	4	NB15 TUBE X (185) (MACHINE ENDS)	(CUT TO SUIT MID-RAILS USED)
4	1	40 x 40 x 6 RSA X 185	----------
3	1	50 x 50 x 6 RSA x 185	----------
2	To suit	40 x 12 FMS x 375	(MID- RAILS WHERE USED)
1	2	100 x 12 FMS x 375	----------
Itemref	Quantity	Title/Name, designation, material, dimension etc	Article No./Reference

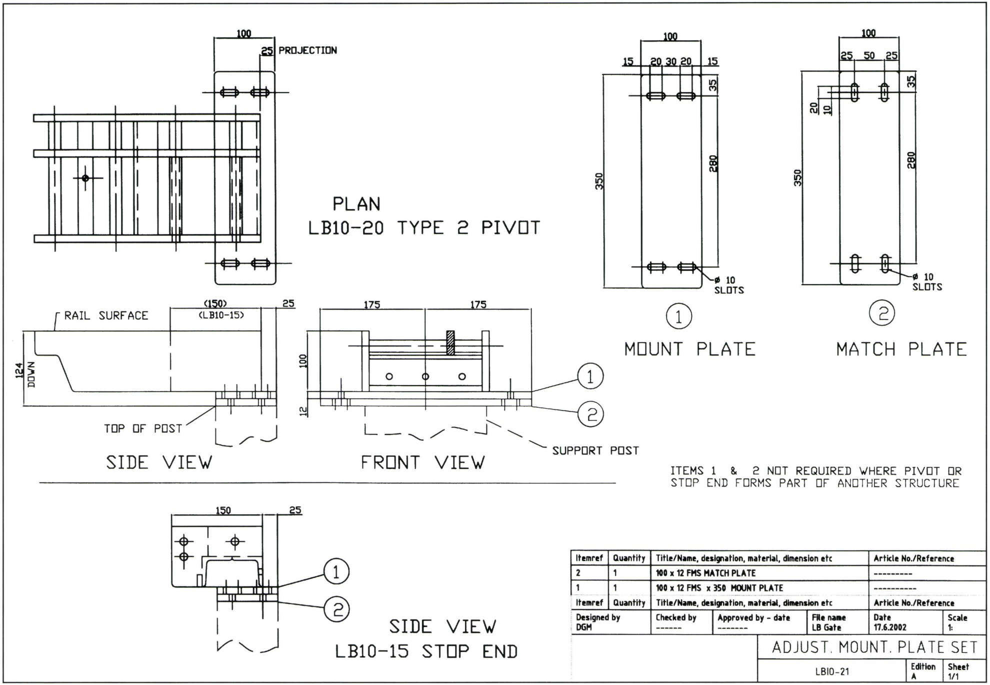
Designed by	Checked by	Approved by - date	File name	Date	Scale
DGM	------	--------	LB Gate	17.6.2002	1:

TYPE 2 PIVOT - 184G

LBIO-20

Edition A

Sheet 1/1



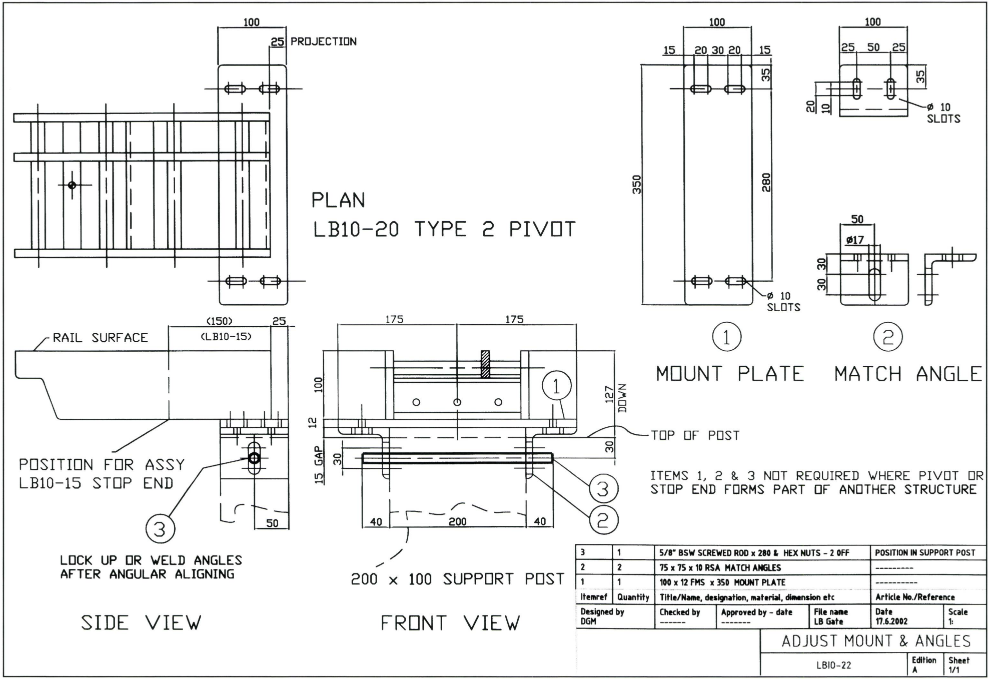
ITEMS 1 & 2 NOT REQUIRED WHERE PIVOT OR STOP END FORMS PART OF ANOTHER STRUCTURE

Itemref	Quantity	Title/Name, designation, material, dimension etc	Article No./Reference
2	1	100 x 12 FMS MATCH PLATE	---------
1	1	100 x 12 FMS x 350 MOUNT PLATE	----------
Itemref	Quantity	Title/Name, designation, material, dimension etc	Article No./Reference

Designed by	Checked by	Approved by - date	File name	Date	Scale
DGM	------	-------	LB Gate	17.6.2002	1:

ADJUST. MOUNT. PLATE SET

	Edition	Sheet
LB10-21	A	1/1

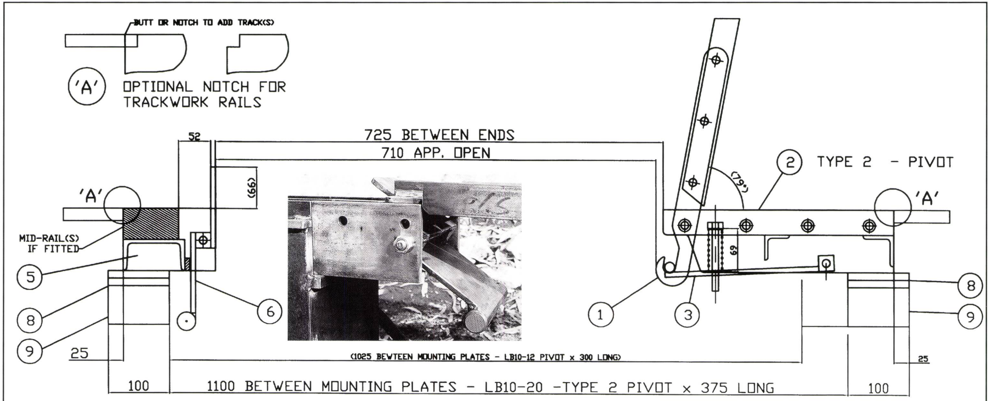


3	1	5/8" BSW SCREWED ROD x 280 & HEX NUTS - 2 OFF	POSITION IN SUPPORT POST
2	2	75 x 75 x 10 RSA MATCH ANGLES	----------
1	1	100 x 12 FMS x 350 MOUNT PLATE	----------
Itemref	Quantity	Title/Name, designation, material, dimension etc	Article No./Reference

Designed by DGM	Checked by ------	Approved by - date -------	File name LB Gate	Date 17.6.2002	Scale 1:

ADJUST MOUNT & ANGLES

LBI0-22	Edition A	Sheet 1/1


BUTT OR NOTCH TO ADD TRACK(S)
'A'
OPTIONAL NOTCH FOR TRACKWORK RAILS
52
725 BETWEEN ENDS
710 APP. OPEN
(99)
'A'
MID-RAIL(S) IF FITTED
5
8
9
6
25
100
(1025 BEWTEEN MOUNTING PLATES - LB10-12 PIVOT x 300 LONG)
1100 BETWEEN MOUNTING PLATES - LB10-20 -TYPE 2 PIVOT x 375 LONG
1
3
69
(79°)
2
TYPE 2 - PIVOT
'A'
8
9
25
100

SIDE ELEVATION - RAISED

ITEMS 8 OR 9 NOT REQUIRED WHERE PIVOT OR STOP END FORMS PART OF ANOTHER STRUCTURE

Itemref	Quantity	Title/Name, designation, material, dimension etc	Article No./Reference
10	-------	--------------	----------------
(9)	(2)	LB10 ADJUST MOUNT AND ANGLES (ALT. TO ITEM 8)	HORIZ, ANGLE & VERT ADJUST
8	2	LB10-21 ADJUST MOUNT PLATE SET	HORIZONTAL ADJUST
(7)	(2)	LB10-17 LONG HINGE	OPTIONAL TO #1 -LB10-1 HINGE
6	1	LB10-16 STOP FLAP	----------
5	1	LB10-15 STOP END	----------
4	1	LB10-14 SPAN RAILS	----------
3	1	LB10-13 SPRING FLAP	----------
2	1	LB10-20 TYPE 2 PIVOT	----------
1	2	LB10-11 HINGE	PROFILE OPTION
Itemref	Quantity	Title/Name, designation, material, dimension etc	Article No./Reference

Itemref	Quantity	Title/Name, designation, material, dimension etc		Article No./Reference	
Designed by DGM	Checked by ------	Approved by - date -------	File name LB Gate	Date 17.6.2002	Scale 1:
			LB GATE (MOUNTING)		
			LB10-23	Edition A	Sheet 1/1

Building the 16/16H Engine

by Peter Hall

Some time last year I received a request from Dave Harper, asking if I could machine and assemble a small steam engine as a project. This engine is the 16/16H single cylinder horizontal double acting slide valve engine kit as marketed by G P Quayle of New Zealand.

The interesting part of this project has been that the kit of parts supplied to make the engine consisted of commercially available items. The metal parts have been cut to length and all bolts, nuts, gasket and gland material were included. The kit also contained a bottle of Loctite® solution to assist in securing parts when assembling. For someone who has not used Loctite in model making, I found the use of it, an interesting concept. The 16/16H engine kit also contained a parts list, a set of seven A3 size drawings and a set of instructions on how to build the engine.

The instructions were well written and I found no errors worth noting. The author of the notes gives a list of dies and taps that are required and a builder of the engine would be wise to follow this instruction. The builder of the 16/16H should also take the advice of the author of the notes and seek expert help where necessary. The included drawings were more accurate than some model engineering drawings that I have come across in the past and they were clearly printed so the chance of errors in reading the drawing were minimal.

The builder of this engine should endeavor to be as accurate as possible with marking out, lathe setting up and machining. Stick to the instructions and you should not go wrong.

While I had all the parts laid out I checked them for size. This collection of parts is shown in **Photo 1**. I found that the steel material that had been sheared was slightly under size but this did not affect the building of the engine. Because of this slight inaccuracy of up to 0.8 of a millimeter, marking out would best be done on these items using the centreline of the material and not measure from one edge. After marking out and squaring up the edges of the material, check the flatness of the material. When drilling any holes do not forget to deburr them.

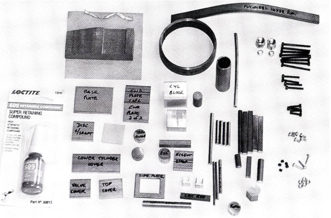


Photo 1

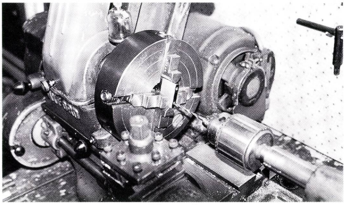


Photo 2

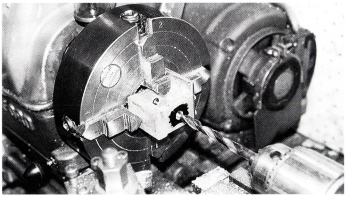


Photo 3

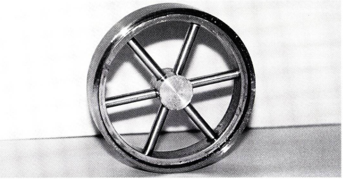


Photo 4

Parts such as the brass end plates are best turned to length, then marked out and drilled in the lathe. I found that my Myford lathe was just the right size for machining the parts for this engine. Drilling the parts in the lathe allows you time to set up accurately and to drill square to the face of the item. **Photo 2** shows the end plates set up in the lathe.

After the end plates were cleaned up and assembled with the Loctite and screws, I allowed the Loctite to set for a time before setting the endplate and base assembly back up in the lathe and drilling the holes for the main bearings. See **Photo 3**.

I had to take my time with the manufacture of the flywheel as outer rim required time to set up. There was not enough material to allow cleanup to correct size. Either the inner brass ring material could be longer, up to 219 mm or the material for the rim could be thicker to allow for a machined dia. of 65.68mm. One of the few errors found in the instruction was with regard to the bending of the brass inner ring. Do not bend the material tightly over a 40mm diameter former. Check the inner size of the outer rim and bend the brass inner ring over a suitable diameter material.

The rest of the flywheel was assembled as per the notes. It was interesting to have to glue a flywheel together and not braze it or cut it from solid. **Photo 4** shows the flywheel after it was assembled. The flywheel boss did not run as true as expected but will machine okay. Take care when doing the final machining of the flywheel outer rim as you may get some chatter because it is being held on a small shaft. **Photo 5** shows the flywheel mounted in the lathe ready for the machining of the boss centre hole.

When I checked the parts list and saw that the eccentric was of stainless material, I shuddered and thought I would have trouble with machining it, but I found it was an easy machining material.

The drawing shows the eccentric strap drilled and tapped for

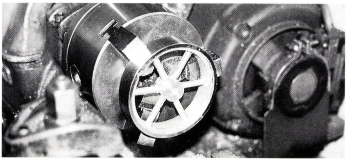


Photo 5

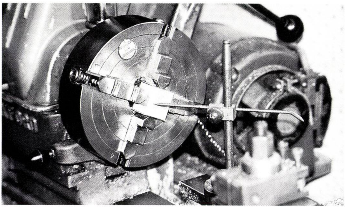


Photo 6

a M3 grub screw and this is what I did with a brand new tap. The only problem that I found was that the commercial screw supplied was very loose in this tapped hole so I have made a special one with a tighter thread.

The author's concept of making a collett to be used to hold the small square brass items when facing them is a very good idea. But you should check the size of the material by measuring across the corners, as there is some variance in the material supplied.

Care needs to be taken when machining the piston, piston rod and trunk guide, as these parts need to be free running in the cylinder to ensure that your engine runs successfully. Care should also be taken when making the parts for the gland out of the screwed brass rod supplied as this brass can be troublesome when parting off. You may prefer to use the junior hacksaw to cut these parts after drilling them. I know the purists among us say that we should not be frightened of parting off, but you cannot tighten the chuck jaws too tight when holding the screwed brass rod in the chuck.

The aluminum supplied for the cylinder block and the valve chest were easily machined and drilled. **Photo 6** shows the cylinder block being set up in the lathe. The valve chest was also set up in the lathe to machine out the chamber for the valve. To ensure accuracy of matching holes you would be best spotting the holes to be drilled from other parts where possible and because of the variety of holes to be drilled and tapped you would be best measuring twice and cutting once. It saves collecting a lot of spare parts under the bench. **Photo 7** shows the cylinder block being used as a guide for drilling the holes for the bottom outer cylinder cover bolts. Nothing had been glued at this stage as the bush for the cylinder has yet to be drilled.

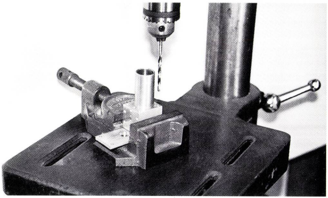


Photo 7

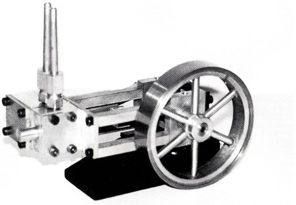


Photo 8

Take your time with the assembly of the 16/16H engine, as you need to ensure that all the parts are free fitting and rotate smoothly and easily. You will need to gently hone some parts with very fine emery to get the fit required. Don't forget to clean well before assembly. I found that the head of the gudgeon bolt was only a few thou proud and this stopped free rotation. After a few trial assemblies I timed the engine as per the author's notes and it now will run on a wisp of compressed air. Maybe I should now make a boiler to see the engine will run on live steam. **Photo 8** shows the assembled engine.

An accurate check of the hours taken to complete was not kept but from my diary I estimate that construction took approximately 25 hours. This time may be shorter if the engine was worked on continually and one did not have the modellers' dilemma of other lifestyle interruptions. I thought that this engine was a good starter kit for someone with some engineering experience and the necessary equipment to carry out the machining. The concept of using commercially available parts is a good one, considering that the availability of a foundry in your neighborhood is fairly rare.

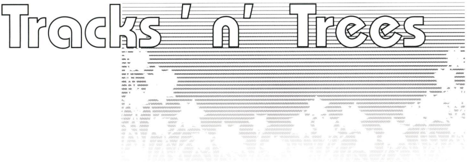
So, to anyone deciding to use this kit, go to it!

Mark Whittaker

Mark Whittaker died on 17 March, 2003 after losing a battle with cancer. Those of you who have been long time readers of this magazine will remember Mark as *AME*'s founding Editor. The following comments are excerpts from a short address given by long time friend, Mike Wilmot at Mark's funeral service.

He was a genuine, articulate and capable fellow and you knew where you stood with him. I first met him some 20 years ago. He was interested in steam engines so he contacted our local model engineering society in Canberra, a group I had just joined, which was then in its infancy. He took over producing the local club magazine, *The Branch Line*, showing he obviously had a hidden talent for writing. After *The Branch Line* had been running for a few months his friend, Walter Shellshear mentioned there had been an Australian model engineering magazine before the 1939-45 war. He checked to see if I knew anything about it. I actually had 4 battered copies from 1938. Mark read them and then announced 'I think we can do this again'. The *Australian Model Engineering* magazine came into being simply because Mark decided it should.

Apart from all of this he was the original "Bob the Builder' and he built and renovated many houses almost single-handedly. His ability with a paint brush was outstanding, both on walls and with an artist's palette. He became a most competent artist and, until recently, enjoyed his time as a volunteer guide at the National Gallery. There were many other activities in which he became engrossed and his thirst for knowledge never waned. His self-taught skills were endless and many of us would be proud to have done half of what he achieved in his lifetime.



Track Power — making the right connections

by David "Doc" Wescombe-Down

Some operators use track power; some prefer battery power; others choose clockwork; and live steam has its advocates. We have already dabbled in live steam so perhaps this time we can look at track power in the garden.

Very simply, the better the electrical conductivity, and the shorter your wiring can be, the better your track power will work outdoors. So let us look at some aspects of conductivity in the garden, and how you can give your layout its best chance to operate well for you, electrically.

If there is a foreign object on your rails, it can be located/seen and physically removed. If a wire to the locomotive can-motor breaks free, it too can be located and repaired. Should any nut, bolt, rivet or other fastener work loose on your steamer, any resultant running problem can be fairly easily rectified as well, but this is not always the case when we suddenly have an absence of current flow in our track-powered rails. We cannot see what we must fix, so in the case of electrification, "an ounce of prevention is worth a pound of cure".

We all have our preference for rail material, how we connect to it and methods of switching/speed control and so on, but *electrically*, some materials work better than others. If we can take that fact onboard and build it into our layout planning, we increase our chances of electrical efficiency and reliability, *longterm*. This means examining the options for rails, joiners, wiring and connections.

Some of the more common rail materials we use outdoors include steel, brass, nickel-silver and aluminium, and (to our knowledge) no track-powered steel track is very successful electrically when used outdoors – it is inherently a poor conductor when compared to the other three types. Ifyou have even a *remote chance* of wanting track power in the future, the advice would be to use nickel-silver or brass track and joiners because of their superior conductivity and weathering abilities. Aluminium is very cost-effective but cannot be soldered easily, so securing of joints and jumper wires becomes a real challenge. If you choose aluminium, remember it reacts with a number of other metals and deteriorates as a result, so you would need to do *everything* else in aluminium or stainless steel to avoid such complications. All metals, except gold, tarnish on exposure to air, and in the case of "everyday" aluminium, its oxide on rails has a high electrical resistance and thus needs to be constantly but would be so soft as to be impractical for rails without various alloy-agents being added. These agents increase the potential for oxidisation and therefore increase the resistance of the rails, which we do not want to occur, so, again, be watchful if you choose aluminium rails.

Brass is one of the more common rail materials and is used by a number of commercial track manufacturers, usually in conjunction with plastic sleepers. Be careful in your choice of these as well, as there are a number of plastic sleeper types which are not UV-stabilised and will therefore not last very long outdoors. LGB rail for gauge 1 appears to quite successful long-term when used outdoors, and there would be other brands as well.

When you visit garden layouts which have been established for about three or more years and still have the track in good condition, ask the builder what he/she used for rails and sleeper material. Alternatively, you could purchase rail lengths and fit them to your own treated exterior-grade timber sleepers. We may look at that process in detail in another edition of *Tracks 'n' Trees.*

Brass is a good performer electrically and can be soft-soldered, which makes it handy for we mere mortals! It will, however, rapidly oxidise outdoors, so needs continual cleaning, but its natural low resistance works in its favour as far as electrical circuit desirability goes for a garden railway. Value-for-money sees brass also as the number one option given that, at the time writing, four metre lengths of gauge 1 rail may be purchased for about $20 per length retail, and gauge O rail for slightly less. Nickel-silver rails, although a superior type for our purposes, are also the most expensive, with 900mm Peco Streamline track sections retailing for around $18 each, including plastic sleepers, and ready for installation.

The oxide which forms on nickel-silver rails is conductive, but not as effective as its parent alloy, so should still be cleaned off regularly. It is readily soft-soldered, has low resistance and excellent electrical properties. All-in-all, if kept clean, there is not a huge electrical difference between aluminium, brass and nickel-silver, but once a number of the rails are joined together in an outdoor configuration, we often create a different situation. *Rail joiners* are usually the Achilles' heel of track-powered garden railways.

If you are using short lengths of commercial set-track, track joiners will be a facet of project construction about which you will need to be fastidious. The resistance present between two sections of the same rail line may be about 2 ohms, and, given an average gauge 1 can-motor impedance of about 5 ohms, the extra couple of track joiner-ohms acts like an additional speed limiter (controller).

Crimping the joiners only helps very temporarily. Dirt, oil, dust and moisture can still all enter the junction and form a resistor which will work in opposition to the track power being applied. A voltage drop will occur at each place your layout has any rail junction poorly connected.If you are planning to track-power your garden empire, our advice would include:

* choose brass or nickel-silver rails, and
* clean the rail ends, inside and out, for about one centimetre, before
* smearing conductive grease on the cleaned ends, and
* assembling the track sections with clean rail joiners, then
* crimping the rail joiner assemblies, before
* soldering a jumper wire across each joiner, and
* soldering the track feeder wires to the rails and feeding power at several places around the layout to keep a consistent and adequate voltage available to your locomotive motors.

In conclusion, we hope the treatment of track power in the garden has been of use to you. We welcome input on what aspects of garden railways would be of interest to you, and, in the meantime, hook up and before you switch on, make sure you have the right connections!

More resources ...

- **Dutch Steam Group and Dutch Model Engineering Society** have more than 1300 plans in 6 different catalogues – many are Gauge 1.

  Nederlandse Vereniging van Modelbouwers

  Secretary: Frans Kamman, v.d. Helstlaan 5, 1412 H G Naarden, NETHERLANDS
  E-mail modeller@knoware.nl

- **TEE Publishing** book, *A Steam Locomotive for O Gauge* which, according to TEE, describes and, with the accompanying set of 17 A3- sized plans, illustrates the construction of **two** O gauge 4-6-0 locomotives – LMS Class 5 or GWR County Class. A Past Masters book from 1955.

  Other titles in TEE's catalogue include *Building a Gauge O Bassett-Lowke 2-6-0 Steam Locomotive.* www.fotec.co.uk/mehs/tee/index.html

News Desk

with David Proctor

Well, here we are again. Firstly, I would like to welcome an old face back to the *AME* editorial team. Many of you may recall that the *Club Roundup* editor in the original *AME* was Gerardus Mol. Gerardus has answered my plea for assistance in the last issue, and commencing with this issue, he is again the compiler of all your club news. Gerardus, good to have you back!

On the subject of people from the original *AME*, founding editor, Mark Whittaker recently passed away as a result of a long illness. See page 59.

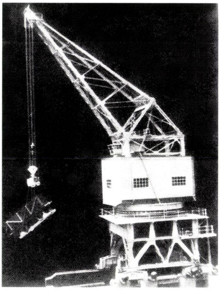
Useful notes from readers

Brian Wheeler from Waikanae in New Zealand writes: With reference to D Nance's parting off problems (*AME* Nov Dec), I recall having similar problems with a second hand Myford Super Seven lathe I purchased some years ago. I tried several methods with no success until I nipped up the headstock bearing adjustment nut. The result — no more parting off problems.

David Rodgers from Goulburn, NSW writes: In issue 106, the articles by Ernie Henne and Stu Martyn interested me because I am doing some foundry work. You could suggest to them that they try HEBEL blocks as a core material. Hebel is a pumice-like cement product. It is light, you can cut it, scrape it, shape it, it is thermally efficient and can be used as a base for furnace linings. ...Much better than house bricks and safer too. *(Hebel is a product of CSR Building Materials).*

Bob Farquhar from Repton writes:

Interest is sought from persons interested in live steam modelling and operating a 5" gauge narrow gauge tramway at Repton (21k south of Coffs Harbour, NSW). We have 1630m of track, help given with modelling,. Contact Bob (02)6655 4635 or email: bobtramway@hotmail.com



Help wanted

A lady in England is trying to locate a 5 ft tall model of a Dockside Coaling Crane made by her father many years ago. It was kept in the Science Museum in London and won the Champoinship Cup in 1937. In 1952 it was purchased by a Mr Harding-Kiff who was emigrating to Australia. The writer does not want the model, she simply wishes to know where it is and if it is on public display. The information is needed for an upcoming article being published in the UK about her father. If you can help, please contact me and I 'll pass it on.

Coming up in the **next issue** we begin a great construction series on building a **Weir Pump**. There will also be a report on this year's Easter Convention plus much more great reading. See you then!

Australian Model Engineering

New Subscription Form

Post: PO Box 21, Higgins ACT 2615 Australia
Phone/Fax: (02) 6254 1641
Email: amemag@bigpond.com

I wish to begin subscribing to the ***Australian Model Engineering*** magazine for **one year** commencing with issue **109 — July-August 2003**

Subscription rates:-

Australia **$38.00** *(Includes GST amount of $3.45)*
New Zealand **A$47** (Air Mail) Other Countries **A$58** (Air Mail)

☐ Tick this box if this is a **gift subscription**. What is the occasion (e.g. Birthday) ....
Name of person sending gift ....

Subscriber's Name ....Phone (.......) ....

ADDRESS ....

.... Post Code ....

Enclosed a **Cheque / Money Order / O/Seas Bank Draft**
or please debit my **Bankcard / VISA / MasterCard** **A$**

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Card Expiry Date
........../..........

Cardholder's Signature .... Name on card (print) ....

May-June 2003

Classifieds

7$^1/_4$" American 2-6-2 tender engine for sale

- Outside framed, Briggs type boiler fitted, fire and smoke boxes fitted, loco on wheels, fitted with axle pump, all boiler fittings, valve gear, turret valves, two injectors, tender on wheels, fitted with air brakes, all materials to finish. $9,000 or near offer.
- Also 2 x 7$^1/_4$" 0-4-0 *Hercules*, with Briggs type boiler, frames made, all castings, drawings, offers around $1200 ea.
- One set 7$^1/_4$" arch bar bogies with air brakes, only needs brake shoes fitted $500. Other items. MUST sell everything due to poor health. These are all unfinished projects. Contact Ray Catts (02)6922 3540

Large 7$^1/_4$" gauge 4-8-4 loco for sale

- Based on early Northern Pacific A class. Ideal for heavy passenger hauling, copper boiler with current certificate, superheated, sight feed lubrication. Westinghouse air compressor, full air-braked with A6ET driver's brake valve. Water feed pumps, steel tyred throughout, all axles on twin sealed ball races. Fully overhauled and painted. Priced at $36,000. Contact John on (08)8362 3269

7 different Hot Air Engine Kits or drawings for sale:

- Contact Edwyn Jones on (07)3351 4454 or email: edmar_jones@hotmail.com

5" gauge Z12 class scale model steam loco for sale

- Tender, driving truck, has been meticulously built to Winter's plans, has current boiler cert. Only run for 1.5 hours. Price $15,000 neg. Ph. Ken or Marie (02)4739 4459, mobile 0427 394 459

7$^1/_4$" 2-6-2 loco rolling chassis and other parts for sale

- 2" x 3" bronze cyls., Baker valve gear and smoke box all fitted. Small box of parts ready to fit. 6" boiler with 7" firebox well on way. Its twin runs at Euroa on public run days. $800 ono. Ph. (03)5795 3705

For sale — Toy soldiers

- Pewter toy soldiers castings 54mm 1/32 scale, send $5 for catalogue and small sample PO Box 219, Merimbula NSW 2548 Australia. www.microcredit.com.au

Large 5" gauge 2-8-4T loco for sale

- Based on Indian *Dholpur* made by Hunslet. Ideal for heavy passenger hauling, copper boiler with current certificate, superheated, site feed lubricator. Vacuum brakes on riding truck, steam brakes on loco. Injector, hand and axle pumps, steel tyres, fully overhauled and painted. Water gin supplies water to pannier tanks via two 11" poppets on Merryweather hand pump. Priced at $17,000. Contact Ron on (03)5166 1328. See GMES website www.geocities.com/gmes1978/

5" gauge NSW 38 class loco for sale

- Plus tender and accessories, good steamer $7,500 ono. Ph. (07)4945 2346 or email: delor@mackay.net.au

Model machining services

- Examples:- lathe, milling, tapping, boring. Casting done to your drawings. Supplier of tools, e.g. drills, lathe, milling cutters. For further details write, fax, phone Stephen Palmer, PO Box 95, Windsor NSW 2756. Fax (02)4572 5679, Phone (02)4574 0153

ENSHU industrial milling machine for sale

- 415 power, fully auto, table L 3"6" x W 10". 40 International taper, geared head. $4,000 ono. Ph. (02)67225106 AH.
- For sale — 3" scale **Burrell single crank** compound castings, profile cut formers and parts. $1,500. Ph. (02)6722 5106 AH

For sale — 3$^1/_2$" gauge live steam loco

- Working model of Chesapeake & Ohio 2-6-6-6 articulated (Mallet) with copper boiler. A finely crafted locomotive with superb attention to detail. Price: $15,000. Packing and freight extra. Contact Dr. P R Giesecke, 16 Gulfview Rd, Blackwood SA 5051. Ph. (08)8278 6231

5" gauge steam train for sale

- Double-head 1033 + 1304 (boiler cert.) with 2 passenger carrying platform end coaches. Excellent condition. See *AME* No. 71 and No. 96. Contact Neil (02)9644 1692

For sale — steam engine *Peter Pan*

- 7$^1/_4$" Wren class 0-4-0 saddle tank. Boiler overhauled, new certificate. Complete with ride-on, excellent condition. $8,500 firm. Ph. (07)5451 1804 (Maroochydore, Qld)

Shaper for sale

- 14" stroke, S.P. motor, VG condition, $500 ono. Located on York Peninsula, SA. Ph. (08)8853 2294

Machining-fabricating capacity available

- Turning, milling, welding, tooling, will tackle anything. Frank Zizza, 6 Elizabeth St. Euroa. Vic 3666. (03)5795 1551

Subscribers' Free Market

FOR SALE

G scale 0-4-0 diesel shunter, new LGB motor unit, all brass/steel construction. $475 ono. Rob (02)4757 1197

HAFCO Geared Head Mill Drill HM40, stand, digital readout on quill, drill chuck, 240V. $2,000. Richard (02)9638 2051

Locomotive Cyclopaedia, 1927 edition $500, Engineering periodicals 1935 $60. Ph. John (08)8379 4548

Complete set Reeves **castings for 5" gauge GWR 5700** class Pannier tank by LBSC. Plans plus *ME* mags 1958-59. Alan (03)5787 1586

Queensland A10 loco, lasercut frames complete, axle boxes, axles fitted, trailing axles, photos, $400. Eric (07)5536 4928

G1 *Philadelphia* 0-4-2 Baldwin, gas fired, built from Argyle locomotive works machinist kit, $2,100. Lukey (07)4067 1508 AH.

Burnerd Multisize EC collets, 5 off as new, cost $255 ea, the lot $125. **5"g electric motor, steam car books/plans** (02)4753 6773

Reamers "Quick-Set" Cleveland Twist Drill Co expanders, eight sizes A to J, in original boxes, Will not separate. (03)9842 3135

Model Engineer #3511—#3897 (April '75 — May/June '91). Approx half in *ME* binders, remainder loose, plus small number kindred publications. (03) 9885 1075.

WANTED

Copies of ***Strictly IC* magazine**, Old Smith's **motorcycle speedos** or parts of, any condition. Please phone Paul (07) 4927 8734

Someone to make or purchase **dummy washout plugs** for 3$^1/_2$", 5" and 7$^1/_4$" locos. Contact Ian (08)9721 2034

***AME* Feb '88 No. 5** (original) to complete collection. (03)9557 3752

Large **9" faceplate** suit Myford Super 7 lathe. Bruce (02)4868 2030

Steady rest — three point for **Hercus** Model A,B,C. Any carriage stop or original coolant can and stand. Michael (08)9752 3573

Travelling steady for Hercus 9" lathe. Call Peter (02)4751 2044 or email: pjcassar@hotmail.com

***Live Steam* magazines**, bound or loose, phone (08)8556 7260 or PO Box 491, McLaren Vale SA 5171

Small Hit and Miss engine, complete with working magneto for restoration. Phone (02)9451 6583

Information on **steam generato**r for locomotives (for 5" gauge). E-mail Mark at hotdog@ssc.net.au

Old **tinplate commercial 0 gauge** toy trains and pre-war Meccano sets. Ph. (02)9913 8422

Article in *MEW* #45 **"Swing Surface Grinder"** could photocopy and fax or scan and email to me. All costs met. Ph/Fax (02)49594052, email: rosssaillard@hotmail.com

Owners **operating manual Douglas 28cm stroke shaper**, will pay for photocopying of manual if necessary. (07)4725 7693

HELP

Built Frost's 7$^1/_4$" **Bagnall** (May '87 *Engineering in Miniature*). Looking for **plans**. Darby Fatherly, 249R Powell Ave, Newburgh NY 12550 USA. JAFATH@aol.com

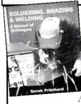
Classified rates

$3.85 (GST incl.) per line as published (including heading).
Don't send payment with ad, we'll invoice you. No limit to no. of words.

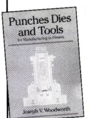
Subscribers Free Market conditions

•Non-commercial only •max 20 words inc. contact details •1 entry per issue
•5" gauge or larger locomotives (for sale) are not eligible.

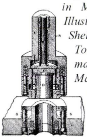
GREAT INFORMATION!
GOOD TUITION!

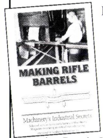


Soldering, Brazing & Welding - a Manual of Techniques [Pritchard] £20.50
Good book on all ways of joining metal together. Covered are soldering and brazing, albeit slightly briefly and then, in much greater detail, Oxy-Acetylene, MMA, MIG and TIG welding. Most of the instructions refer to welding steel, but welding other materials and distortion control are covered in separate chapters, as is quality in welding. Recommended for those taking up welding, or as a reference book if you have some experience. 160 pages full of drawings, diagrams and photographs. Larger format paperback.

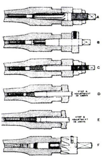


Punches Dies and Tools for Manufacturing in Presses {1931} [Woodworth] £24.45
A companion to the same author s book Dies, Their Construction and Use this book is *An Encyclopedia of Die-making, Punch-Making, Die-Sinking, Sheet Metal Working, and Making of Special Tools, Devices and Mechanical Combinations for Piercing, Punching, Cutting, Bending, Forming, Drawing, Compressing, Embossing, Forging and Assembling Metal Parts, and also Articles of Other Materials in Machine Tools, including Special Sections Illustrating and Explaining the Making of Cartridge Shells, Wire and Bar Steel Drawing Dies, Press Tools for Making Hydraulic Leather Packing, the making of Paint and Chemical Tablets, Manufacture of Pens, Pins and Needles, Jewelry and Eye-Glass Die-Making, Spoon and Fork-Making Dies, Sub-Press Die-Making for Watch and Clock Work, Drop Dies, Drop Forging and Ornamental Die-Making.* Get the picture? 538 pages choc-a-bloc full of information. 736 illustrations, the bulk being drawings. Paperback.





Making Rifle Barrels {c. 1916-1918} £ 8.95
Fascinating series of articles extracted from MACHINERY MAGAZINE showing exactly how rifle barrels were made during the First World War. There are 26 pages on Machining the *Lee-Enfield* Barrel, 27 pages on Drilling, Reaming and Straightening Rifle Barrels, with the final 10 pages covering Machining Rifling Bars on the Bench Lathe and on Drilling a Long Blind Hole. Detailed and interesting information of interest to today s gunsmith, even if the processes described, other than in the final section, are essentially industrial. Softcover.

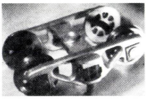


Prices shown INCLUDE Air Post to Australasia

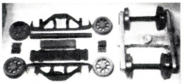
CAMDEN MINIATURE STEAM SERVICES
BARROW FARM, RODE, FROME, SOMERSET.
BAI I 6PS. U-K
24 hour phone: 00I I 44I 373 830I5I
Fax: 00I I 44I 373 8305I6
Website: www.camdenmin.co.uk
VISA MasterCard

Hobby MECHANICS

More Details on our Website:
www.hobbymechanics.com.au
Suppliers of Machinery and Tools for Working in Metal and Wood



Budget Bogies



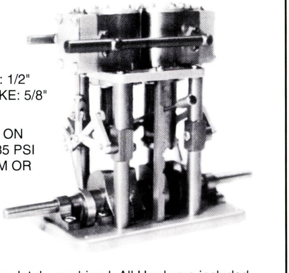
Based on Queensland Government Railways Design

Item	7¼" Gauge	5" Gauge
Bogie Frames, Aluminium	$65.50 set	$37.90 set
Axleboxes C.I. One stick	$12.50 ea	$8.20 ea
Wheels	$25.30 ea	$10.80 ea
Springs, set of 8	$24.00 set	$22.50 set
Complete set of parts	$330.50 set	$185.95 set
Ready to run, anti-friction bearings	$445.50 set	$335.95 set

Please add 10% GST to the above prices

JOHN STRACHAN
HOBBY MECHANICS
P.O. BOX 785, KENMORE QLD 4069 • **Phone (07) 3374 2871**
• Fax (07) 3374 2959 • E-mail: jstrach@powerup.com.au

TWIN CYLINDER VERTICAL REVERSING STEAM ENGINE ASSEMBLY KIT



BORE: 1/2"
STROKE: 5/8"

RUNS ON
5 TO 35 PSI
STEAM OR
AIR

Completely machined. All Hardware included.
Only Hand tools required for assembly.
MODEL TVR1A $570

EMCO MACHINE TOOLS
AUSTRALIA PTY LIMITED

2/247 Rawson Street
Auburn, NSW, 2144
Australia

Phone: (02) 9648 4377
Fax: (02) 9648 4150
ACN 002 506 139

VISA MasterCard

MINI TECH Engineering & Model Supplies

4 Jaw Ind Chucks
Quality light weight 4 jaw independent plain back chuck to suit Myford and other small lathes
150mm $279.00
100mm $269.00

CQ6123B 230 x 500mm,3 & 4 jaw chucks, steadies etc quality machine with accuracy report **$1390**

8 Pce Turning Tool Sets
8 shaped turning tools & boring bar, made of fully ground HSS.
6x6mm *TTS8P06* $65.00
8x8mm *TTS8P08* $74.00
10x10mm *TTS8P10* $88.00

Tailstock Die Holder
Fits into lathe tailstock for easy thread cutting. Either 2MT or 3MT floating shank with 13/16", 1", 1.5/16", 1.1/2" die holders.
TDH-2MT or *TDH-3MT* $99.50

Tax Time GOOD BUYS From Minitech

Suds Pump
Industrial size, 300x600x200mm with strainer & baffles. Complete with hoses and nozzle kit $289.00

VERTEX VICES
VK-4 4" Milling Vice $170
VK-5 5" Milling Vice $250
VK-6 6" Milling Vice $285

BA Tap & Die Set 23pce
Carbon Steel Taper & Plug taps & Die
Sizes: 0, 2, 4, 6, 8, 10, 12 BA
In box with die holder and tap wrench.
BATDS $99.00

Horizontal Vertical Rotary Table 4" / 100mm
ideal for small milling machines or for use on vertical slides
RT-040 $297.00
Clamp Kit for RT-040 $29.50

Vertex Rotary Tables:
HV-4 4"/100mm $375.00
HV-6 6"/150mm $375.00
HV-8 8"/200mm $555.00
Dividing Plates & Tailstocks Avail

Measuring Tools
Digital Verniers 6" $75.00
Digital Verniers 8" $110.00
Micrometer 3 piece Set
0-3" or 0-75mm $85.00

2MT Collet Set
6 piece collet set, 3,4,5,6,8,10mm
MVS1424-03 $77.00

Slot Drill Set
6 Piece Slot Drill Set, HSS 3,4,5,6,8,10mm
MVS1424-04 $60.50

Drill Sets
Drill Set 10 Piece MT1, MT2 14 to 23mm $155
Drill Set HSS, Number #1-#60 *06-002* $53.90
Drill Set HSS, Number #61-#80 *06-003* $19.80
Keyless Chuck .5 to 6.5mm JT1 *11061* $84.70

6/16 Kenworth Place, BRENDALE Qld 4500. Ph 07 3889 7689 Fax 07 3889 6877
Web: www.minitech.com.au email: sales@minitech.com.au Catalogues Available $5 posted

MODEL ENGINEERING SUPPLIES

A CN 064 886 924

We supply a wide range of Model Engineers supplies

TAPS and DIES: . . . British Association. Model Engineer, Brass.

FASTENERS: . . . . . BA Screws, in Standard and Small Hexagon, Cheese, Round and Countersunk heads, Nuts, Washers and all-thread. Rivets, Pins.

MATERIALS: . . . . . Copper, Brass, Bright Mild Steel, Stainless Steel, Silver Steel, Cast Iron, Gunmetal, Bronze, Spring Steel in all shapes and sizes.

FITTINGS: . . . . Injectors, Pressure Gauges, Valves, Water Gauges, Pumps, Whistles, Plumbing Fittings, Lubricators, Drain Cocks.

MISCELLANEOUS: O-rings, Gauge Glass, Stainless Balls, Gland Packing, Springs, Tube Brushes, Filter Gauze, Laser Cut Frames.

CASTINGS: . . . . . . Simplex, Blowfly, VR K and J Class, Sweet Pea, Sweet William, Meter Maid, Tapping Tool, Quartering Jig, Angle Blocks and more.

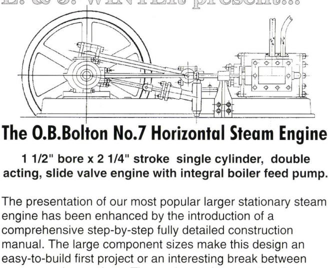
DRAWINGS: . . . . . . Locos, Tooling, Stationary Engines, Traction Engines.

ROLLING STOCK: Kits for VR T Van, GY Wagon Petrol Tanker, Auto Couplers, Wheels, W Irons, Axle Boxes, Buffers and Hooks.

We offer a very friendly and efficient service.
For a FREE Price List write, phone or fax:
Wayne Roberts
7 Reeves Close, Tullamarine, Vic, 3043
Phone: (03) 9338 7368 Fax: (03) 9330 0840
CREDIT CARDS WELCOME

Internet: http://www.mesupplies.com.au e-mail: wayne@mesupplies.com.au

E. & J. WINTER present...



The O.B.Bolton No.7 Horizontal Steam Engine

1 1/2" bore x 2 1/4" stroke single cylinder, double acting, slide valve engine with integral boiler feed pump.

The presentation of our most popular larger stationary steam engine has been enhanced by the introduction of a comprehensive step-by-step fully detailed construction manual. The large component sizes make this design an easy-to-build first project or an interesting break between more complex engines. The engine makes an attractive working or static display and some are earning their keep as useful workhorses.

Plans (2 sheets) $18.50
Casting set (28 items) $241.96
Construction manual $19.80
Material kit $25.58, Fastener kit $69.20
allow freight for 9kg plus lkg.

For casting list and prices please write, fax or phone:
E. & J. Winter
PO Box 124, MEDOWIE, NSW, 2318
Phone & fax: (02) 4981 7999
e-mail: ejwinter@ozemail.com.au

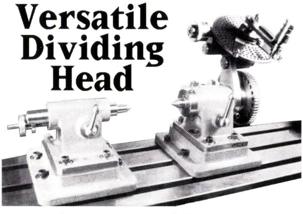
Send for our 44 page illustrated handbook just $7.00 (inc. GST) posted.

Hobby MECHANICS

More Details on our Website:
www.hobbymechanics.com.au
Suppliers of Machinery and Tools for Working in Metal and Wood

By agreement with N.S. & A. HEMINGWAY, Rochdale, UK, we are pleased to announce the availability of items to construct the world-renowned:

Versatile Dividing Head



Pre-cut Gears and Worms are available, as well as castings and blanks for plates. Please send S.A.E.for Details and Prices.

JOHN STRACHAN
HOBBY MECHANICS
P.O. BOX 785, KENMORE QLD 4069 • **Phone (07) 3374 2871**
• Fax (07) 3374 2959 • E-mail: jstrach@powerup.com.au

The Bendigo Society of Model Engineers

Presents

The 5th Bendigo Model Engineering Exhibition

at the Kangaroo Flat Leisure Centre, Browning Street, Kangaroo Flat

Saturday 5 July 2003
9.00 am - 5.00 pm

Sunday 6 July 2003
9.00 am - 4.00 pm

Trade and Club Sites Available

For further information and entry forms contact:

Ray Hayward
(03) 5442 4500

Gordon Hunter
(03) 5443 4887
New e-mail: huntergj@iinet.net.au

Catagories for Exhibition

1. Model Engineer Machine Tools and Equipment
2. Steam Engines and Boilers
3. Model Internal Combustion Engines
4. Hot Air Engines
5. Model Aeros and Engines
6. Model Traction Engines and other Road Vehicles
7. Model Cars
8. Miniature Locos
9. Model Horse Drawn Vehicles
10. Model Farm Machinery
11. Alternate Energy Systems (Models)
12. Meccano Models
13. Clock and Optical Apparatus
14. Model Ships and Boats
15. Model Aircraft
16. General Handcrafts (Jewellery, Enamelling, Leather Work etc.)

Rolling Stock and Detail Components

Australian Distributors for:

Doug Hewson (Models) UK
Rolling stock components

AME 422 class loco detail parts

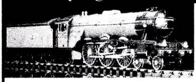
For more information, send a stamped ($1) A4 self addressed envelope to:

Barry Glover
31 Spinks Rd. CORRIMAL, NSW, 2518
Ph (02) 4284 0294 Fax (02) 4283 2331

Argyle Locomotive Works

Gauge One Steam Locomotive Engineers

Flying Scotsman Gresley A3



The worlds most famous locomotive in Gauge 1, 3 cylinders, Holcroft/Gresley valve gear, spirit fired, L.N.E.R. livery, corridor tender.

Ph/Fax Intl: 61-359-686573. Natl: 0359-686573.
E.Mail. argyleloco@mail.fhills.hotkey.net.au
241 Belgrave-Gembrook Rd. Clematis. 3782 Australia
www.argyleloco.com.au

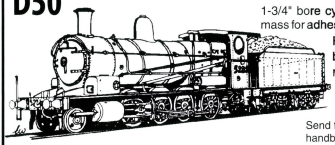
Arrival in July/November 2002.
Reservations required for delivery.
Indicative Pricing $9600-$9800

G.1 & G.0, Live steam locomotives. Standard and narrow gauge types. Assembly kits and Ready-to-run. Valuations for disposals/sale items.

E. & J. WINTER Present...

Our latest addition to the finest range of Australian prototype locomotives in the passenger carrying gauges.

D50



NSWGR D50 class 2-8-0 steam locomotive for 5" gauge

1-3/4" bore cylinders and eight 4-1/2" diameter driving wheels with around 200lb mass for adhesion should provide a great passenger mover for club traffic.

Fully detailed plans to our usual standards are nearing completion and basic castings (wheels, horns, axleboxes, cylinders etc.) are available now.

Send for our 44 page illustrated handbook just $7.00 posted.

For further details please write, fax or phone:
E. & J. Winter
PO Box 124, MEDOWIE, NSW, 2318
Phone & fax: (02) 4981 7999
e-mail: ejwinter@ozemail.com.au

AME Retail

BOOKS

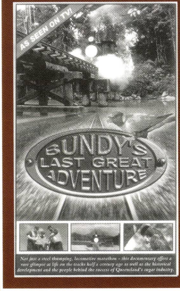
A Compendium of NSW Steam Locomotives	$53.85
Among Their Favourites**	$48.50
An Era in Steam by Ron Preston	$39.95
Australian Steam Locomotives 1896-1958	$72.00
Australia's Last Giants of Steam, David Burke,	$55.00
Away with Steam**	$28.00
Bridges Down Under (soft cover)**	$44.00
Byways of Steam - 7	$31.00
Byways of Steam - 9	$31.00
Byways of Steam - 10	$34.00
Byways of Steam - 11	$37.50
Byways of Steam - 12	$37.50
Byways of Steam - 13	$42.00
Byways of Steam - 14	$37.50
Byways of Steam - 16	$42.00
Byways of Steam - Encore	$38.50
Coaching Stock of the NSW Railways Vol.1**	$90.00
Days of the Goods Trains	$55.00
Early Diesel and Elec. Locos of the NSWGR	$55.50
Four Decades of Railway Photography**	$37.00
Full Steam Across the Mountains	$36.00
Green Diesels - 40 and 41 classes (NSW)	$55.50
On Southern Lines by Ron Preston	$33.00
Rail Scene NSW Vol.12 (soft cover)	$43.00
Remember When	$50.00
South Maitland Railways	$45.00
Standards in Steam the 50 class (hard cover)**	$51.00
Standards in Steam 53/55 class (soft cover)	$35.00
Standards in Steam 53/55 class (hard cover)	$60.00
Tasmania's Hagans by Geoff Murdoch	$24.95
The P Class	$49.95
The 34 & 35 classes	$55.50
The Blowfly Manual	$55.00
The Model Injector Explained	$9.00
The Shimmer of Steel	$74.00

** indicates low stock

AMBSC Code Part 1 (copper boilers)	$15.00
AMBSC Code Part 2 (steel boilers)	$15.00

(Boiler code price does not include postage and handling fees)

New Video available



Not just a steel thumping, locomotive marathon – this documentary offers a rare glimpse at life on the tracks half a century ago as well as the historical development and the people behind the success of Queensland's sugar industry.

A must for Queensland narrow gauge fans!

This high definition film covers the journey of a "Bundy" Fowler 2ft gauge locomotive as it travels 2000 kilometres from its museum home at Woodford in the South Queensland sub-tropics to the banks of the Daintree River in the lush tropical wilderness of Far North Queensland.

This tiny-but-tough loco travels through breathtakingly beautiful locations: spectacular landscapes, amazing wildlife, rural lifestyles and some outrageous characters, and of course it's not short of a yarn or two.

VHS, PAL Colour,
Approximately 55 minutes.

Price: $35.00 incl postage.

422 class 5" gauge locomotive castings

Cabs: $515.00 per pair.
Bogie frames with dummy brake cylinders: $394.00 per pair.
Cabs and bogies set $905.00.

422 class 5" gauge locomotive Construction Manual

Price: $75.00. As many back issues containing the series are out of print we are offering this 200 page collection, A4 size manual (bound photocopies of all articles).

Golden Arrow (aprox 1.5m model steam launch) drawings are full-model size (1 sheet hull template & 1 sheet boiler) $16.00

Bettendorf bogie kit

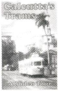
5" gauge (for scale wagons only, not suitable for riding cars). Kit comprises of two bogies made up of 4 side frames, 2 bolsters, 8 cast wheels, 16 springs and 4 axles. $275 per kit.

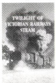
2003 Calendars available at $10.00 each

Queensland Railway's BB18-1/4 Print $34.95 ea.

Videos

9461 Freight - A Driver's View	$29.50
Calcutta's Trams	$35.00
China - Last of the Steam Dragons	$29.50
Days of Steam No.2	$41.50
Junee Roundhouse Celebrations 1997	$19.95
Last Train to... Last Run of...	$29.50
Magic of Steam	$41.50
Peter Peckett & Puffing Billy	$29.50
Pichi Richi & the Northern Aust' Dream	$35.00
R711 Back in Steam	$29.50
Rail Motor Journeys over Lost VR Lines	$29.50
Rail Motors Remembered	$29.50
Riding the Beechy & other NG Lines	$29.50
Steam and Diesel Review 1997	$44.50
Steam and Diesel Review 1998-1999	$46.50
Steam and Diesel Review 2000-2002	$46.75
Steam Around the State	$29.50
Steam in Focus No.1	$29.50
Steam in Focus No.2	$29.50
Steam in Focus No.3	$29.50
Steam in Focus No.4	$29.50
Steam in Focus No.5	$29.50
Steam in Focus No.6	$29.50
The 8mm Collection - Branch Lines	$36.00
The Darjeeling Himalayan Railway	$59.00
The Great 100 Working	$41.50
Twilight of Victorian Railways Steam	$29.50





e-mail direct to AME Retail:
jpoliver@webone.com.au

Prices include GST, postage and packaging Australia wide except where indicated.
Payment by cheque, money order, Bankcard, VISA or MasterCard to:

AME Retail

PO Box 1403, Tuggeranong, ACT, 2901
Phone / Fax : (02) 6292 1938
http://www.ameng.com.au

Plough Book Sales

A History of Aircraft Piston Engines, 244 pages	$58.00
A.H. McDonald, Industrial Pioneer, 318 pages	$33.00
A-Z of British Stationary Engines Volume Two: L-Z, 128 pages	$43.45
Bentley Br2 World War 1 Rotary Aero Engine, 95 pages	$53.50
Boiler Operator's Handbook by George Preston, 92 pages	$29.00
Caterpillar Cronicle: History of the World's Greatest Earthmovers	$69.95
Caterpillar Seventy-Five Years by Thomas Wilk, 279 pages	$110.00
Crawler Tractor Scrapbook Part One by Richard H. Robinson, 160pp	$54.95
Crawler Tractor Scrapbook Part Four, 160 pages	$54.95
Diesel's Engine Vol. I, From Conception to 1918, by Cummins, 768pp	$135.00
Experimental Flash Steam, 189 pages	$51.50
"K1" 1st Garratt in Tasmania, 235 pages NEW	$170.00
Major Piston Aero Engines of World War II, 192 pages	$135.00
Producer Gas for Motor Vehicles, 194 pages	$31.50
The Pioneer of the Road, Australia's First Self-Powered Vehicle	$22.00
The Rotary Aero Engine by Andrew Nahum, 64 pages	$56.50
Guide for the Boiler Attendant's & Engine Driver's Certificate, 269pp	$27.45
Stationary Steam Engines of Gt. Britain Vol 1: Yorkshire, 320 pages	$105.00
Stationary Steam Engines of Gt. Britain Vol 6. 256 pages NEW	$96.50
Traction Engine Design and Construction 1900 - 1930, 342 pages	$165.00
Beyer, Peacock locomotive builders to the world, 302 pages	$132.00
La Locomotive A Vapeur by A. Chapelon (ENGLISH edition), 631pp	$210.00
Practical Distiller (1910), 156 pages	$22.00
The Red Devil and other Tales from the Age of Steam, 522 pages	$115.50
Windmills & Wind Motors (1910), 78 pages	$17.00
A Practical Treatise on Hot Air Engines by E.T. Westbury	$38.00
An Intro to Low Temperature Differential Stirling Engines, 88 pages	$29.50
Building Simple Model Steam Engines by Tubal Cain, 107 pages	$16.95
Building Simple Model Steam Engines Book 2 by Tubal Cain, 106pp	$18.95
Building the Atkinson Differential Engine by Gingery, 112 pages	$37.00
Building the Climax by Kozo Hiraoka, 224 pages	$121.00
Building the Henly 'Junior' Steam Engine, 6 pages	$8.00
Building the Stuart Beam Engine by A. Smith	$26.00
Do It Yourself Vacuum Forming for the hobbyist, 125 pages	$30.25
Gas Engine Construction (1900), 296 pages	$34.00
Gas Turbine Engines for Model Aircraft by Kurt Schreckling, 106pages	$49.50
Making Clocks by Stan Bray, WPS No.33, 124 pages	$19.95
Model Boilers and Boilermaking by K.N.Harris	$51.50
Model Boilermaking Designing Making & Testing by E.L. Pearce	$22.00
Model Engineering, A Foundation Course by Peter Wright, 408pp	$45.00
Model Hit and Miss Engine 1-1/8" bore 1-1/2" Stroke, 41 pages	$34.00
Model Petrol Engines - Design & Construction	$22.00
Model Stationary and Marine Steam Engines, 153 pages	$47.50
Model Stationary Engines, Their Design and Construction, 72 pages	$22.00
Model Turbo-Prop Engines by Kurt Schreckling	$49.50
So You Want to Build a Live Steam Locomotive, 161 pages	$86.90
Steam & Stirling Engines You Can Build Book 2, 200 pages	$99.00
Steam and Stirling Engines You Can Build by W. C. Fitt, 160 pages	$99.00
The Model Locomotive from Scratch by B. Terry Aspin, 92 pages	$29.95
The Stirling Engine Manual by James Rizzo, 195 pages	$95.00
Twin Cylinder Horizontal Steam Engine plans, 6 pages	$7.50
Design, Construction & Operating Principles of Electromagnets	$20.50
Strictly I.C. magazine	$20.50
Fuel from Water Energy Independence With Hydrogen, 251 pages	$62.00
Ignition Coils and Magnetos in Miniature, How to build them	$60.00
High Frequency Induction Heating (1944), 235 pages	$29.50
How to Build a Solar Cell that Really Works, 22 pages	$12.00
How to Run Three Phase Motors on Single Phase Power, 20 pages	$7.50
Secrets of Lead-Acid Batteries, 44 pages	$12.00
The Tesla Disc Turbine by W.M.J. Cairns, 34 pages	$23.00
507 Mechanical Movements (1893), 122 pages	$19.50
Advanced Machine Work (1925 workshop), 800 pages	$73.00
Bent Iron Work Including Elementary Art Metal Work, 160 pages	$24.50
Blacksmith Shop & Iron Forging, 96 pages	$18.00
Build an Oil-Fired Tilting Furnace by Steve Chastain, 192 pages	$45.00
Building a Small Lathe by L.C.Mason, 82 pages	$33.50
Farm Blacksmithing Practical Hints for Handy-Men, 272 pages	$31.95
Forge Craft (1913) by Charles Philip Crowe, 175 pages	$24.50
Foundry Manual (1958 US Navy publication), 300 pages	$48.50
From Forge & Anvil, Erich Riesel Hill Country Iron Worker, 96 pages	$63.00
Grinding, Lapping & Honing, 78 pages	$22.00
Hardening, Tempering, Annealing and Forging of Steel, 288 pages	$24.50
How I pour Babbitt Bearings by Vincent R. Gingery, 43 pages	$19.00
How to Build a Forge, 15 pages	$12.00
How to Run a Metal Working Shaper & Drill Press, 48 pages	$17.00
Indexing Tricks (1903 milling machine work), 31 pages	$9.75
Iron Melting Cupola Furnaces for the Small Foundry, 129 pages	$41.00
Lapping & Polishing by E.K. Hammond	$20.00
Lathe Accessories How to make & use them, 112 pages	$26.00
Lil Bertha Electric Furnace, 67 pages	$22.00
Machine Shop Methods by Lorus J. Milne, 376 pages	$46.00
Machinery Handbook 26th Edition (tool box edition), 2511 pages	$224.40
Melting & Casting Aluminium (1925), 253 pages	$24.50
Milling Machine Practice from Cincinnati Milling Machine Co. 28pp	$9.50
Modern Toolmaking Methods (1915) by Franklin D. Jones, 309 pages	$31.50
New Edge of the Anvil A Resource Book for the Blacksmith, 243pp	$65.45
Plain and Ornamental Forging by Ernst Schwarzkopf, 296 pages	$47.50
Practical Lessons in Metal Turning & Screwcutting, 178 pages	$35.00
Practical Metal Turning by Joseph Horner, 404 pages	$58.00
Punches Dies and Tools for Manufacturing in Presses NEW	$58.00
Secrets of Building a Plastic Injection Molding Machine, 127 pages	$36.50
Simple Workshop Devices by Tubal Cain, WPS No. 28, 140 pages	$18.95
Sir Joseph Whitworth "The World's Best Mechanician", 228 pages	$70.00
Tabletop Machining A basic approach to making small parts	$105.00
The Beginners Guide to the Lathe by P. Marshall, 93 pages	$22.00
The Care and Operation of a Lathe (1942), 105 pages	$18.00
The Complete Handbook of Sand Casting by C.W. Ammen, 238 pp	$40.90
The Design and Use of Instruments and Mechanisms NEW	$43.00
The Machinist's Bedside Reader, Projects, hints, tips, 210 pages	$49.50
The Machinist's Second Bedside Reader by G. Lautard, 213 pages	$55.00
The Machinist's Third Bedside Reader by G. Lautard, 250 pages	$68.20
Treatise on Milling and Milling Machines (1919), 409 pages	$34.00
Turning Lathes: A Guide to Turning, Screwcutting, etc, 432 pages	$60.00
"Uncle" Dave Gingery's Shop Note Book 1, 59 pages	$20.00
Ways & Means (1892 machinist book), 158 pages	$24.50
Zeus Precision Data Charts and Ref. Tables (Metric), 28 pages	$12.50

We handle many other modeling, railway and metalworking books from the UK and the USA for a complete catalogue of over 6000 titles please send $2.25 (Payment may be by postage stamps).

Or check out our web site at www.ploughbooksales.com.au

Please allow 12-15 weeks delivery for some items. Payment can be made by Bankcard, VISA card, Mastercard, cheque or money order to:

Plough Book Sales
PO Box 14, Belmont, VIC, 3216
Phone (03) 5266 1262 Fax: (03) 5266 2180

Postage and Handling Charges

Order Value	Postage Charge
$0 - $10	$2.75
$10 - $20	$3.85
$20 - $60	$6.60
$60 - $165	$10.45
Over $165	Free